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Skeptical Inquirer

Vol. 34 No. 6 | November/December 2010 THE MAGAZINE FOR SCIENCE & REASON

MONSTER MAYHEM

SPECIAL ISSUE

FRANKENSTEIN WAS NOT A DOCTOR

ZOMBIES: THE LIVING DEAD

GHOST-HUNTING MISTAKES

THE GOLEM AND ARTIFICIAL LIFE

PARANORMAL ROMANCE

THE MYSTERIOUS WEM GHOST PHOTO

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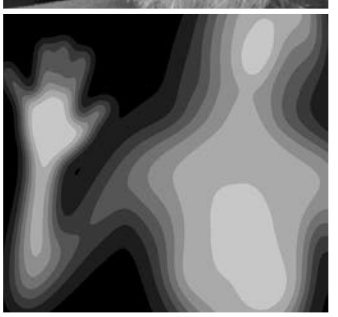

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Cover photo: "BED" by Joshua Hoffine.
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A Medley of Monsters and Mayhem

You may find this issue a bit scarier than the last. After all, it's got monsters on its cover and inside its pages. Monsters are everywhere these days—at least in pop culture. From the vampires in the *Twilight* movies to the spirits in the hit *Ghost Hunters* TV show (now in its sixth season), interest in monsters and paranormal predators has never been higher. To celebrate all things spooky, we have assembled a special issue devoted to monsters—all from a skeptical perspective.

Massimo Polidoro fills us in on the golem monster of Jewish legend, while our own intrepid Joe Nickell dishes the dirt on zombies (including his cinematic stint as the undead). Blake Smith discusses the interesting case of a famous ghost photo taken in England; Tonya Keyser provides a revealing look at the recent surge in paranormal romance fiction, and Ron Watkins re-examines the titular scientist in Mary Shelley's classic horror novel *Frankenstein*. Plus, I contribute an analysis of common ghost-hunting mistakes. And the fun doesn't stop there—be sure to check out our website for Karen Stollznow's special online-only installment of her "Naked Skeptic" column on the monstrous Frog Boy.

While there is an undeniable entertainment element to monsters, there can also be a more serious side. No one *really* believes in ghosts or vampires or witches, right? In fact, polls show that many Americans do believe in ghosts and haunted houses. In late August, a North Carolina man was killed during a search for specters. He, along with a dozen members of an amateur ghost-hunting group, were on a railroad bridge hoping to glimpse a "ghost train" when a real train came along. The vampire beast *el chupacabra* is thought by many to exist throughout Latin America, and a recent poll found that over half of those living in sub-Saharan Africa believe in witchcraft—which results in the murders of many innocent children and albinos.

A New Column

We introduce a new column in this issue: "The Science of Medicine" by Steven Novella, MD. In his first contribution, Novella provides a nuanced explanation of the much-misunderstood placebo effect (more properly *effects*) that I think will be valuable to skeptics and nonskeptics alike. Novella is one of the country's best-informed and most active skeptics. A clinical neurologist, he is assistant professor and director of general neurology at Yale School of Medicine. He's well known in the world of skepticism as founder and president of the New England Skeptical Society and host of its lively podcast the *Skeptics' Guide to the Universe*. He is also executive editor of the *Science-Based Medicine* blog and has his own useful blog, *NeuroLogica*. Novella is a Committee for Skeptical Inquiry fellow. He joins a powerhouse list of regular physician-skeptic contributors to the SKEPTICAL INQUIRER.

CSI Committee for Skeptical Inquiry

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The SKEPTICAL INQUIRER is the official journal of the Committee for Skeptical Inquiry, an international organization.

The SKEPTICAL INQUIRER (ISSN 0194-6730) is published bimonthly by the Committee for Skeptical Inquiry, 3965 Rensch Road, Amherst, NY 14228. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at additional mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $4.95. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or MasterCard. Canada Publications Mail Agreement No. 41153509. Return undeliverable Canadian addresses to: IMEX, P.O. Box 4332, Station Rd., Toronto, ON M5W 3J4.

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Three-Country Evolution Poll: Stark Contrast in U.S. vs. Canadian and British Beliefs

Kendrick Frazier

We already know that compared with most developed countries of the world, acceptance of evolution in the United States is dismal. Jon Miller and colleagues reported in 2006 that polls in thirty-four countries showed that only one—Turkey—had a lower rate of acceptance of evolution. The United States was, as he put it, "out on a limb by ourselves" (SI, May/June 2006).

A new three-country poll not only reveals data on how far behind the United States is on this point—compared to its two closest nations in the English-speaking world, Canada and Britain—but also gives fascinating regional details.

Polls of representative samples of Americans, Canadians, and Britons were carried out by Angus Reid Public Opinion in the first nine days of July 2010 and announced on July 15. The contrast among nations is starkly worded in the title of the company's own announcement of the results: "Americans are Creationists: Britons and Canadians Side with Evolution."

Americans remain firmly on the wrong side of the science when it comes to evolution, which is perhaps the key fundamental unifying principle of biology. Evolution has strong multiple lines of supporting evidence and has long been accepted by life scientists, who value its explanatory power.

The online survey asked respondents whether their own point of view is closest to the notion that human beings evolved from less advanced life forms over millions of years or the idea that God created human beings in their present form within the past 10,000 years.

Origin of Humans

Which of these statements comes closest to your own point of view regarding the origin and development of human beings on Earth?

	Canada	United States	Great Britain
Human beings evolved from less advanced life forms over millions of years.	61%	35%	68%
God created human beings in their present form within the past 10,000 years.	24%	47%	16%
I'm not sure.	15%	18%	15%

Americans remain firmly on the wrong side of the science when it comes to evolution, which is perhaps the key fundamental unifying principle of biology.

In Britain, two-thirds of respondents (68 percent) side with evolution, while fewer than one-in-five people (16 percent) choose creationism. At least seven-in-ten respondents in the South of England (70 percent) and Scotland (75 percent) believe that human beings evolved from less advanced life forms over millions of years. At 58 percent, London holds the smallest proportion of evolutionists.

In Canada, three-in-five respondents (61 percent) select evolution from the options provided, while one-in-four people (24 percent) choose creationism. Quebec (66 percent), along with British Columbia and the Atlantic provinces (64 percent), hold the highest proportion of respondents who believe human beings evolved. At the other end of the spectrum, 39 percent of the residents of Manitoba and Saskatchewan think God created human beings in their present form.

In the United States, almost half of respondents (47 percent) believe that God created human beings in their present form within the past 10,000 years, while one-third (35 percent) think human beings evolved from less advanced life forms over millions of years. Half of midwesterners (49 percent) and southerners (51 percent) agree with creationism, while those in the Northeast are more likely to side with evolution (43 percent).

In the United States, more males than females accept that human beings evolved from less advanced life forms.

Gender and age breakdowns showed some interesting differences as well. In the United States, more males than females accept that human beings evolved from less advanced life forms (43 percent vs. 28 percent). Americans aged eighteen to thirty-four were evenly divided between evolution and creation (41 percent vs. 41 percent), while those age fifty-five and over were less accepting (32 percent saying humans evolved vs. 51 percent saying God created humans in their present form). Those in the intermediate age group (35–54) showed beliefs not much different from their older counterparts (33 percent evolution, 49 percent creation).

In Britain, 72 percent of males vs. 65 percent of females accept evolution; the age distribution is fairly even. In Canada, 69 percent of males and 54 percent of females accept evolution, and younger people are more accepting.

The accompanying tables display some of the comparisons.

The full poll is available online at www.visioncritical.com/2010/07/americans-are-creationists-britons-and-canadians-side-with-evolution/.

GREAT BRITAIN

Which of these statements comes closest to your own point of view regarding the origin and development of human beings on Earth?

		REGION				
	GREAT BRITAIN	London	South of England	Midlands and Wales	North of England	Scotland
Human beings evolved from less advanced life forms over millions of years.	68%	58%	70%	68%	69%	75%
God created human beings in their present form within the past 10,000 years.	16%	25%	15%	15%	16%	12%
I'm not sure.	15%	17%	15%	17%	15%	13%

UNITED STATES

Which of these statements comes closest to your own point of view regarding the origin and development of human beings on Earth?

		REGION			
	UNITED STATES	Northeast	Midwest	South	West
Human beings evolved from less advanced life forms over millions of years.	35%	43%	37%	27%	38%
God created human beings in their present form within the past 10,000 years.	47%	38%	49%	51%	45%
I'm not sure.	18%	19%	13%	21%	16%

CANADA

Which of these statements comes closest to your own point of view regarding the origin and development of human beings on Earth?

		REGION					
	CANADA	British Columbia	Alberta	Manitoba/ Saskatchewan	Ontario	Quebec	Atlantic Provinces
Human beings evolved from less advanced life forms over millions of years.	61%	64%	51%	50%	60%	66%	64%
God created human beings in their present form within the past 10,000 years.	24%	21%	31%	39%	25%	17%	28%
I'm not sure.	15%	16%	18%	11%	15%	17%	8%

The Amaz!ng Meeting of 2010

KAREN STOLLZNOW

"What's a TAM?" we're asked by the uninitiated.

We reply, incredulously, "You haven't heard of TAM?"

Those who self-identify as skeptics know that TAM is the acronym for The Amaz!ng Meeting, which is hosted by James "The Amazing" Randi and his organization, the James Randi Educational Foundation (JREF).

The world's largest conference on critical thinking, TAM is like a Technology, Entertainment, Design (TED) conference, a G8 summit, or a World Economic Forum (WEF) Annual Meeting for skeptics.

Now in its eighth year, TAM has come a long way from its humble origin of merely 150 skeptics assembled in Fort Lauderdale, Florida, back in 2003. My first meeting, TAM3, attracted some 500 guests—this is where I met conference birth-giver Girl 6, as she knitted quietly in the front row of the conference hall. TAM has grown exponentially to welcome some 1,300 attendees in the United States, with additional events including meetings in England and Australia and cruises.

Held at the South Point Hotel in Las Vegas, July 8–11, 2010, the central themes of TAM8 were unification, education, and outreach.

Photo: Bruce F. Press Photography

D.J. Grothe interviews biologist Richard Dawkins at TAM8.

TAM is like a Technology, Entertainment, Design (TED) conference, a G8 summit, or a World Economic Forum (WEF) Annual Meeting for skeptics.

Come Together

With D.J. Grothe at the helm as president, the JREF has focused on the unification of the skeptical movement. Local organizations and grassroots groups are always encouraged; there is strength in numbers, though, and we're all unified by our ideology and common goals. At Grothe's insistence, TAM8 was a coming together of the world's major skeptical organizations, and the event was co-sponsored by the Committee for Skeptical Inquiry (CSI) and the Skeptics Society. These organizations were represented by skeptics who appeared on various panels and workshops, including CSI's Barry Karr, Ken Frazier, and Joe Nickell and *Skeptic* magazine's Michael Shermer, Pat Linse, and Daniel Loxton.

The meeting featured its usual "celebrity skeptics," including *Mythbusters*'s Adam Savage (see my *Point of Inquiry* interview, excerpted in this issue), mentalist Banachek, and notable academics Richard Dawkins and Carol Tavris. TAM8 also concentrated on the history and roots of skepticism. This year's meeting paid homage to seminal skeptics Paul Kurtz, Ray Hyman, Ken Frazier, and James Randi and paid last respects to Martin Gardner, arguably the founder of the modern skeptical movement.

Some skeptics deny there is a "skeptical movement"—due to the phrase's religious and bureaucratic connotations—and prefer "critical thinkers" or "community." During an interview with comedy writer David Javerbaum, Javerbaum argued against the idea that there is a "movement," remarking that "trying to organize skeptics is like herding cats."

Skeptics certainly aren't cats or sheep to be herded, but there *were* 1,300 of us there…

Preaching to the Unconverted (and the Converted)

Years ago, TAM moved from a winter date to a summer schedule to enable educators to attend during their school holidays. Randi's organization is busy keeping the "education" in "JREF."

In their commitment to pedagogy, the JREF secured Michael Blanford as director of education and established a number of educational initiatives—in-

cluding workshops that provide resources for teachers and other educators and grants to encourage the creation of critical-thinking courses at secondary and tertiary levels.

TAM8 offered more workshops than ever before, focusing on grassroots skepticism and education. "Skepticism in the Classroom" featured Daniel Loxton, Matt Lowry, and Michael Blanford, who presented materials and practical tips to increase science literacy, science appreciation, critical thinking, and skepticism—not only in schools but in society. We don't need to be teachers to teach, and of course skepticism begins at home.

In my "Skepticism 101" workshop with Jeff Wagg, we highlighted the importance of not only teaching critical thinking but continuing to learn it ourselves. Skepticism is an ongoing education. We need to "preach" not only to the unconverted but also to the choir; even the choir can forget the songs.

Do unto Others

TAM8 acknowledged the importance of outreach and grassroots activism, but it also recognized the need to improve the public image of skepticism. The message was that we can increase our effectiveness and increase our numbers by simply being . . . nicer.

We all know the stereotypes of skeptics. There is the boring, bearded, bespectacled old man. There is the cynical and cantankerous curmudgeon. There is the self-righteous, smug, superior know-it-all. Rather than worrying about gender or age, we should worry about approaches and attitudes.

In the "Skepticism 101" workshop, we spoke about skeptics' duty of care toward believers, and we encouraged skeptics to be diplomatic when representing skepticism. Becoming a skeptic means becoming an activist—a face and voice for skepticism.

Phil Plait also tackled these themes. In what has become known as the "Don't Be a Dick" speech, Plait voiced his concerns over the public perception of skeptics as antisocial, egotistical, and abrasive. He reports that the growing popularity of Skepticism 2.0 has also seen a rise in rudeness online. Plait's plea was that we should avoid undue attacks and insults because we're most persuasive when we are respectful and rational.

Of course, there's a time to be confrontational, but there's also a time to be considerate. Such animosity is often directed toward believers, but the conflict also occurs among skeptics, manifesting in feuds and factions that appear online. Now is an exciting and necessary time to be a skeptic; we should ignore internal bickering and schoolyard squabbles so we can just get on with the job.

What Happens in Vegas . . .

TAM8 was a long weekend of rousing talks, workshops, panels, stimulating speakers, socializing, and networking. Hopefully, what happened in Vegas *won't* stay in Vegas.

Skeptics are still "coming down" after what is known as the "TAM high" and eagerly awaiting next year's event. Let's maintain the motivation and stay inspired. Barring unwanted acquisitions, such as gambling debts or surprise spouses, don't let what happened in Vegas stay there. Take home the new friendships you forged, the knowledge you gained, the ideas, and the inspiration. But don't keep these to yourself; share them with your family, friends, and community.

This is what skepticism is all about.

See photos from Randi's Amazing Meeting in Las Vegas at:
www.csicop.org/SIExtras

MonsterTalk Podcast Celebrates Anniversary with Parsec Nomination

MonsterTalk, a free audio podcast that critically examines the science behind monsters such as Bigfoot, Nessie, and werewolves, recently celebrated its first anniversary with a Parsec award nomination (for Best Fact Behind the Fiction podcast) and over 10,000 downloads per episode. Hosted by Blake Smith, SKEPTICAL INQUIRER Managing Editor Benjamin Radford, and CSI columnist Karen Stollznow, *MonsterTalk* goes beyond typical, superficial media-friendly sound bites. Its long-form interviews allow experts (who are often working scientists) to provide depth and context to their subjects. It is also one of the few skeptical podcasts that presents original research by the show's co-hosts. The topics are diverse, and past show topics have included Mothman, dinosaurs, genetic engineering, hybrids, H.P. Lovecraft, the ivory-billed woodpecker, vampires, Bigfoot "dermal ridges," insects, ghosts, and the chupacabra.

MonsterTalk can also be heard via subscription on iTunes;
for more information visit www.skeptic.com/podcasts/monstertalk/.

MonsterTalk podcast co-hosts Blake Smith, Benjamin Radford, and Karen Stollznow

Study: If Asked, God May Improve Vision and Hearing

BENJAMIN RADFORD

A study released in August 2010 claimed to have found evidence that, if specifically requested, God might heal those with impaired hearing and vision. Candy Gunther Brown, an associate professor in the Department of Religious Studies at Indiana University–Bloomington, led the study of "proximal intercessory prayer." The study, published in the September issue of the *Southern Medical Journal* and titled "Study of the Therapeutic Effects of Proximal Intercessory Prayer (STEPP) on Auditory and Visual Impairments in Rural Mozambique," measured improvements in vision and hearing in a rural area of the southern African country.

The team used an audiometer and vision charts to evaluate fourteen patients who reported impaired hearing and eleven who reported impaired vision, both before and after members of a local church prayed for their healing. Subjects reported a small but statistically significant improvement in hearing and vision following the prayers.

At first glance the study is interesting, but upon closer examination serious limitations become apparent. First, the sample size is tiny; with only twenty-four participants the results are very difficult to generalize to a larger population. Second, the measures studied by Brown and her colleagues were inherently subjective and were not objectively measured. Indeed, the authors admit that "auditory and visual impairments are . . . not unaffected by psychosomatic factors."

A double-blind study (that is, one in which neither the researchers nor the patients know who gets the treatment and who is in the control group) would have been far more reliable. It would help control for the well-known placebo effect; it is not only possible but likely that those who receive personal, special attention from prayer groups and researchers might genuinely believe that they can see or hear better, at least temporarily—much in the way that a person who takes a placebo that they believe is a pain reliever might experience less pain.

Furthermore, the study did not control for the pre-existing beliefs of the patients. According to the study, "subjects were recruited at Charismatic Protestant meetings . . . widely reputed among Pentecostals globally as 'specialists' in praying for those with hearing and vision impairments." That is, all the subjects in the study not only firmly believed in the power of prayer, but they believed such prayer was especially helpful in treating eye and ear problems. The subjects could have easily been influenced by what scientists call "demand characteristics": patients telling the researchers (and those who prayed) what the patients think the researchers want to hear. It would be interesting (and important) to know whether or not maladies in atheists, agnostics, and others who lack a pre-existing belief in the power of prayer would be improved.

It is worth noting that better-designed studies have found prayer is ineffective. In 2006, researchers at six major medical centers, including Harvard and the Mayo Clinic, completed the largest prayer study to date—"Study of the Therapeutic Effects of Intercessory Prayer 'STEP' in Cardiac Bypass Patients," published in the *American Heart Journal*. Research for this study, led by Dr. Herbert Benson, was conducted over almost a decade. Two thousand cardiac surgery patients were randomly assigned to different prayer groups. Prayer was found to have no beneficial effect on recovery time, death rate, or any other factor.

Brown and her colleagues addressed neither the mechanism by which the prayer was supposedly effective (how exactly the prayer helped) nor why a benevolent god would help only those whom he is specifically asked to assist. ■

Mosquito Zappers Get Zapped

TERENCE HINES

We've all seen them: those ads for devices that repel mosquitoes by emitting a high-frequency sound that—it is claimed—prevents little biters from actually biting. Now a malaria scientist in the Netherlands has been taking action against those claims. As reported in *Science* ("Mosquito Buzzer Won't Fly," March 5, 2010), Bart Knols, who runs the website MalariaWorld.org, saw an ad for the MozStop device in KLM Royal Dutch Airlines's in-flight magazine. He complained to the airline and the ads were removed. Since the report in *Science*, British Airways and Finnair have also removed such ads. Knols was especially concerned that people going to places where malaria is endemic would buy the product and believe, incorrectly, that they were being protected. Knols's website provides a link to a 2007 paper, "Electronic Mosquito Repellents for Preventing Mosquito Bites and Malaria Infection" (by A.A. Enayati, J. Hemingway, and P. Garner), that was published as a Cochrane Review. This review found that the devices "have no effect on preventing mosquito bites." Thus, it is highly irresponsible to advertise them with any implication that they prevent malaria.

Knols's successful efforts to remove fraudulent ads show that it is possible for skeptics to make a difference, one little bit at a time. This maxim has proved true in my own experience as well. A few years ago, I had very good results in having ads pulled from a number of local radio stations—for the "See Clearly" method of eyesight improvement. The See Clearly method claimed that eyeglasses actually make vision worse.

As the saying goes: think globally; act locally. ■

Terence Hines is professor of psychology at Pace University and author of *Pseudoscience and the Paranormal* (Prometheus Books). He may be reached via e-mail at TerenceHines@aol.com.

Ghost Hunter Killed Seeking 'Ghost Train'

Benjamin Radford

In the wake of popular "reality" TV shows like *Ghost Hunters* and *Paranormal State*, police across the country have seen a recent upsurge in people being arrested, injured, and even killed while looking for ghosts.

Christopher Kaiser was killed on August 28, 2010, while ghost hunting with a group of friends. The group of a dozen amateur ghost hunters had gathered on a bridge over Third Creek near Statesville, North Carolina, hoping to see the ghost of a train that crashed there 119 years earlier, killing thirty people. The ghost-hunting group believed a local legend that the train's ghost would materialize on the anniversary of the accident. The ghost train did not appear, but a real one did: a Norfolk Southern came around a bend heading toward them. Kaiser was the sole fatality.

Kaiser's death is the most recent example of the dangers of looking for ghosts. But also in August 2010, in Meriden, Connecticut, three ghost hunters were seriously injured while fleeing from police after trespassing in an old building reputed to be haunted. When police arrived at the building, which is private property well marked with "no trespassing" signs, the men scrambled to avoid arrest—running off a cliff in the darkness.

In August 2006, an Ohio girl was shot while exploring a supposedly haunted house near a cemetery. In their hunt for ghosts, Rachel Barezinsky and her friends had trespassed onto the property of Allen Davis, who fired a rifle at the teens—who he mistook for vandals. Barezinsky was critically wounded with gunshots to the head and shoulder; she survived but remains disabled with short-term memory loss and limited use of her arms and legs.

In September 2009, a twenty-nine-year-old Canadian woman was killed while ghost hunting at a historic University of Toronto building. The woman, along with a man with whom she was on a first date, had entered the building at around 2AM and was searching for ghosts when she fell three floors to her death from the roof.

The tragic irony is that there is no scientific proof that ghosts exist (and if they do, they certainly have never injured or killed anyone), yet the pursuit of ghosts can be a very dangerous activity.

The Loss of Climate Scientist Stephen H. Schneider

Kendrick Frazier

Those who work at the intersection of science and the public, especially those in the world of climate science, have been mourning the death of Stephen H. Schneider.

Stephen H. Schneider

Schneider, one of the world's most respected and outspoken climate scientists, died of an apparent heart attack on July 19 while traveling to London. He was sixty-five years old.

Schneider was a member of the National Academy of Sciences, a MacArthur Fellow, and a co-recipient of the 2007 Nobel Peace Prize for his work with the Intergovernmental Panel on Climate Change.

He was a strong defender of good science and had thought deeply about the responsibilities of scientists: both to perform good science and to work with policymakers, media, and members of the public to explain their findings. Unlike many scientists, Schneider was comfortable and effective when working at the turbulent crossroads of science and public affairs. He gave frequent congressional testimony, made regular media appearances, and was a fine writer and communicator. His book about his experiences in the Climate Wars, *Science as a Contact Sport*, is reviewed in this issue.

Schneider's short invited piece "Climate Change: Skeptics vs. Deniers" appeared in our May/June 2009 issue. It is still very pertinent. Earlier this year Schneider was nominated to become a fellow of the Committee for Skeptical Inquiry and indicated he would accept if elected.

Paul Ehrlich, Schneider's Stanford University friend and colleague, offered a moving personal tribute in the August 13 issue of *Science*. Other testimonials by friends and colleagues worldwide can be found on the web.

Short tributes to Stephen H. Schneider by Kendrick Frazier and Thomas Casten are available on the CSI website at **csicop.org/specialarticles.**

An Open Letter in Defense of Reason

In its official Classification of Occupations and Specializations, the Polish Ministry of Labour and Social Policy included, among others, the professions of fortune-teller, astrologer, and dowser. Polish scientists from all over the world have protested against this absurdity.

TOMASZ WITKOWSKI

Many of my friends know that I am interested in pseudoscience and other related absurdities, so they often send me information concerning such issues. In February 2009, one friend wrote to me that Poland's official governmental classification of occupations includes such entries as fortune-teller, astrologer, and dowser (among others). After taking a closer look at these entries and finding them preposterous, I decided to comment on their inclusion in my blog *In Defence of Reason* (www.tomaszwitkowski.pl).

Tomasz Witkowski is a researcher and writer with a PhD in psychology. He is author of many books, including Zakazana Psychologia: *Pomi dzy Szarlataneri a Nauk [Forbidden Psychology: Between Charlatanry and Science]*. His website is at www.tomaszwitkowski.pl, and he can be reached via e-mail at witkowski@moderator.wroc.pl.

Some of my readers reacted with a smile about what Poland's Ministry of Labour and Social Policy did; others reacted with disbelief or pity. Among the latter group was Professor Lukasz Turski from the Center for Theoretical Physics of the Polish Academy of Sciences. Turski, Tomasz Sowiński (also from the Center for Theoretical Physics), and I wrote a letter about the inclusion of these professions in the official governmental classification of occupations and posted it on the Internet; it was signed by many readers who shared our view. Below are excerpts from the letter:

Open letter to Jolanta Fedak, the Minister of Labour and Social Policy

Dear Minister,

Labour Offices, being public institutions subordinate to the Minister of Labour and Social Policy, have published on the Internet (www.psz.praca.gov.pl) a document entitled: Classification of occupations and specialisations. This document . . . approves the exercise of occupations listed in the Classification in Poland, as well as, in an exceptionally precise manner, defines what the essence of performing the occupations in question is.

We, the undersigned, deem it scandalous to add to the list a number of occupations not having anything in common with the civilisation of the twenty-first century, and by no means with the official mission declared by the government of the Republic of Poland to create a society based on knowledge and reason. Such entries include the "professions" of astrologer, fortune-teller, bio-energy therapist, reflexology therapist, dowser, etc. [One questionable entry is] described at length below: . . .

"Fortune-teller
Synthesis:
intentionally uses inborn talents to act in the area of supernatural phenomena, gains insight into past and future events with the application of various forms of foretelling shaped by tradition, such as: cards (tarot in particular), fortune-telling, I-ching (based on the Ancient Chinese Book of Changes), chiromancy (palm reading), catoptromancy and crystalomancy (foretelling by means of a mirror or crystal), and others.

Professional tasks:

- foretell, or, occasionally, reveal past—depending on the adopted method and level of the fortune-teller's knowledge—related with specific counselling or psychotherapy;
- counsel with respect to missing persons or belongings;
- explain the origin and settings of phenomena defined as extraordinary.

Additional professional tasks:
- use the skill of clairvoyance, clairaudience, [to] support the foretelling with mediumistic phenomena, use telepathy, teleportation, as well as draw on information in morphogenetic fields;
- apply methods characteristic of astrology, numerology, psycho-graphology or other bio-tronic areas."

We firmly state that the text . . . of the above [entry is] completely senseless and full of fundamental scientific errors. [The questionable entries] also spread superstitions as well as a para-scientific approach to the reality. They also allow persons who conduct healing activities to invoke the aforementioned document in case of revelation of such activities which breach the law, e.g., conducting a kind of "healing" practice (compare Professional tasks of astrologer).

We would like to emphasise the fact that the definition of dowsing validated in the directive as one of the types of crafts was the basis for the Supreme Court to allow opinions of dowsers on equal grounds with opinions issued by other forensic experts.

. . . We indicate that the publication of the document "Classification of occupations and specialisations—descriptions of groups and occupations" on the website of an institution subordinate to the Minister ridicules your office and thus jeopardises the dignity of the Republic of Poland.

We believe that wasting of public funds and funds provided by the European Union for the preparation of these kinds of absurd documents should be subject to punishment. That is why we demand that full names of perpetrators of this scandalous list should be made public. Owing to economic turbulence on the world markets Poland is in a very difficult situation, which will be not easy to escape. In this challenging task we will find no support from fortune-tellers or shamans, but [will find support] from engineers, scientists, teachers, doctors and other hard-working people from different walks of life. We consider placing them on the same list as astrologers and reflexology therapists, allowed by the constitutional authorities of Poland, as an unqualified insult. On behalf of all those people we demand an apology and removal of the "occupations" in question from the Classification.

Professor Lukasz A. Turski, PhD
Tomasz Witkowski, PhD
Tomasz Sowiński, PhD

The definition of dowsing validated in the directive ... was the basis for the Supreme Court to allow opinions of dowsers on equal grounds with opinions issued by other forensic experts.

Soon after our letter was published, we mailed out information about our protest. The letter was made available for signing for five days and was signed by 4,982 persons. Initially, primarily scientists signed it. In addition to representatives of the majority of Polish universities, among the signatories were employees of scientific institutions the world over.

The media quickly spotted the announcement of the protest, and for a few days information about our campaign had the status of hot news. It was given wide coverage on Polish TV, in the daily press, and on the Internet. Journalists requested that the Ministry take a stance on our letter. The below quotation is the first official statement with respect to fortune-tellers in Poland:

> "We will not exclude fortune-tellers from the list of occupations; there is an occupation of scientist, there is also a fortune-teller," Bożena Diaba, press officer of the Ministry of Labour and Social Policy, said to the Polish Press Agency with reference to the letter of scientists protesting against such occupations as astrologer, fortune-teller or bio-energy therapist being placed on the list. (http://tinyurl.com/29o3zt9)

Apparently, the press officer had not bothered to look through the occupation document, which lists neither "scientist" nor, for instance, "poet." We closed the list of signatures on March 2, 2009, and submitted it, along with our open letter, to the Minister of Labour and Social Policy, Jolanta Fedak. A copy of those documents was also submitted to the Secretary of State in the Chancellery of the Prime Minister of the Republic of Poland. We received an official reply

from the Ministry on March 13, presented in five pages. It is worth quoting this fragment in full:

> **III. Fortune-teller in the Classification of occupations and specialisations**
>
> The Classification of occupations and specialisations for the needs of the labour market, called often for short an economic classification, comprises those occupations and specialisations, which in fact are found on the labour market. Hence such classification should objectively reflect the fact of existence of a set of occupations performed by persons active economically, and the types of activities conducted by them. They also include activities that are deemed unconventional, e.g., paramedical, astrological, spiritualistic, etc. It is of no significance what their ontological status and the essence of performed ascribed tasks are. The classification does not provide for any obligation to use services of entities/persons performing individual occupations, either. The official recognition of a given occupation, which is preceded by inclusion in the Classification, is understood exclusively as a possibility to keep on in records, primarily for statistical purposes. Fortune-tellers, astrologers, and bio-energy therapists will provide their services irrespective of whether names of their occupations will be allowed or deleted in the Classification. The advantages of such deletion seem doubtful, since it would lead to an incomplete or limited image of the structure of occupations found in the labour market.
>
> The fact of including an occupation in the Classification indicates only that this occupation functions in the labour market, regardless of the fact whether it is legally sanctioned or not. The Classification of occupations should not be mistaken for a so-called list of regulated professions, the exercise of which is subject to regulations of law.
>
> Assuming that each working person should find their professional affiliation in the Classification of occupations, it should be understood that this also relates to those persons who perform such controversial—in your view—occupations as fortune-teller, reflexology therapist, dowser, astrologer or bio-energy therapist.
>
> As mentioned earlier, the Classification of occupations and specialisations is primarily applied to conduct statistical research and prepare analyses of the labour market. If it lacks any of [the] occupations/specialisations actually found in the labour market, it may significantly distort the image of reality.
>
> MINISTER
> Jolanta Fedak

One may try to re-read this text several times, replacing the mentioned occupations of fortune-teller, dowser, astrologer, and others with such professions as matrimonial racketeer, prostitute, drug dealer, or contract thug. The logic of arguments will be equally coherent in these cases: These are actually performed occupations, functioning on the labor market, and nobody forces anybody to use the services of these providers. These people also provide their services regardless of whether their jobs are included in the Classification or not. The lack of these occupations in the Classification does lead to an incomplete or limited image of reality.

The Minister has not, however, taken a stance toward possible legal consequences resulting from individual occupations being included in the Classification. What if, for example, the Polish Supreme Court were to allow establishing a forensic expert in the area of fortune-telling, astrology, bio-energy therapy, or similar specialization on the same grounds as other forensic experts? It is only a matter of time now before a clever lawyer makes use of this provision and forces a divorce decree with the help of a clairvoyant. After all, a clairvoyant's opinion is of the same weight as, for instance, a criminologist's. I fear even to think about other possible consequences of such decisions.

What if ... the Polish Supreme Court were to allow establishing a forensic expert in the area of fortune-telling, astrology, bio-energy therapy, or similar specialization on the same grounds as other forensic experts ?

There are also some legal consequences of this situation for education. The inclusion of these occupations creates a legal opportunity to compile a formal description of the occupation of fortune-teller by a minister competent for this specialization. Then, in response to an application of, for example, the Harry Potter Society of Fortune-Tellers, the minister could prepare a catalogue of skills necessary for performing the tasks of a fortune-teller—based on that, the education minister could work out curricula for schools and standards of examinations. The only thing left is to hope that nobody in court will have to face an opinion issued by a forensic expert in the field of fortune-telling, and no wizard societies will flood ministers with petitions. But this is only a hope. Unfortunately, Polish law allows for it.

MythBusters's Adam Savage

Adam Savage is co-host of the Discovery Channel's *MythBusters*. He has a diverse background in animation and design, and for almost two decades he's concentrated on the special effects industry in film, theater, and television. A prominent skeptic, Savage lectures in science education and is a strong promoter of critical thinking. **Karen Stollznow**, a host of the Center for Inquiry's *Point of Inquiry* podcast, recently spoke with him.

Do you consider yourself to be a skeptic? Do you call yourself a skeptic or an atheist or a free thinker or a humanist?

All of the above. I had never sought out to identify myself as a skeptic. I hadn't quite realized where *MythBusters* placed within the cosmology of the skeptical universe, but, you know, we're smack in the middle of it. We always are thinking critically, especially about ourselves.

We are, I think, still the only television show willing to say that we got an entire hour of programming wrong. We'll go back and revisit our results. Often the episodes in which we come back with new data and come to different conclusions than before are our favorite episodes. We recognize that's probably the most important scientific lesson we can teach in the show. It just grew out of our realization that we had done something wrong.

It's brilliant that you're open to saying that you're wrong about something and to be able to re-evaluate. That is part and parcel of being a critical thinker.

There's a phrase I came up with early on in doing the show: "Failure is always an option." I had that printed on our crew hats and crew shirts and I realized, in fact, it is a deeply scientific phrase because people think of an experiment as something set out to prove something. And it's not. It's something set out to test something. So whether you're right or wrong about your preconceptions, the experiment that yields data is still a successful experiment. That's what we mean by "Failure is always an option."

So how would you say you apply that to your experiments?

Probably the best tool that Jamie [Hyneman, my *MythBusters* co-host] and I have applying skepticism to our experiments is each other. Our relationship, like any strong partnership, is based on a tremendous amount of creative tension. We have large and small disagreements constantly about the way to proceed with things.

Healthy skepticism?

Yeah. We are always poking holes in the other's ideas. We will fight for what we want to do until the right idea really does make itself clear. Then we'll give up. We have no ego when it comes to the elegant solution. But the fact is, up until that elegant solution has been reached we argue almost constantly. We recognize that in that push-pull there's a tremendous amount of strength. There's a check and a balance that means that everything we work on together is inherently going to be stronger than the things we work on separately.

So what do you say to people who claim that your show is not sufficiently rigorous and that you don't always apply the scientific method?

I admit outright that our show is not sufficiently rigorous. It's not meant to be a show about scientific inquiry. It's meant to be a show about critical inquiry and where to begin looking at it from a scientific standpoint. I say that we do not stand by our results. I stand solidly behind our methodologies. We always would like to have more than one test, more than three tests. Our show is not meant to be taken as any kind of science fact in

"I admit outright that our show is not sufficiently rigorous. It's not meant to be a show about scientific inquiry. It's meant to be a show about critical inquiry and where to begin looking at it from a scientific standpoint."

CREDIT: c99/ZUMA Press/Newscom

terms of our results. The science is in how to proceed from one experiment to the next with what you've learned.

Preliminary tests [are] not meant to be conclusive.

Exactly. The structure of our show is five or six acts depending on the commercial break and on where in the world you watch it. In general, you start out with, What's the myth? What's the plan? Then we go down to the shop; we do some scale testing. We often do medium-scale testing. Then we do full-scale testing. Pretty much all the science happens by the time we're done with the medium-scale testing. That's the point at which we have really illuminated the features of the physics that we're exploring. The full-scale testing is usually just the trick we use to keep people watching until the end where they get to watch full-size cars smash into each other and prove the point that we demonstrated with the medium-scale testing.

That's ultimately what everyone wants to see.

It is. Even after a hundred and ninety eight hours and eight years of doing this show, everyone still comes up and says, "I love that cement truck when it blows up!" After three thousand different explosions over the years…

You can remember all of them?

. . .they're like wines to Jamie and me. We can sense their differences and their nuances. But for me, falling hot water heaters is the single greatest thing I like to watch blow up. There is no more satisfying thud in the world.

Are there any topics that are off-limits to you guys?

There are several categories we don't touch: what [James] Randi would call woo-woo [and] what we call oogie-boogie. I'm still ashamed we ever went near pyramid power as a story to test. All of those mystical things. Dowsing is an open question that we've been thinking back and forth about for years whether or not to do it on the show. We're never going to look for the Loch Ness Monster. We're never going to look for Bigfoot. We're not going to try to prove a negative. We are always going to look for something that we can actually get our hands on and do tests toward the goal of coming to a conclusion.

There are a lot of paranormal and pseudoscientific themes that you could test and actually come up with a reasonable conclusion. So have you ever wanted to do a show or a spin-off show that focuses on the paranormal?

It's very difficult. One of the things I like about our show is it's very localized to us. We have brought experts in from the outside from time to time. That introduces problems from a production standpoint. If you're going to be testing the paranormal, by definition you're bringing people in, and there's a gotcha aspect to that. That is not what *MythBusters* is about. It's not to say that I don't realize that everyone claiming to have mystical powers is a charlatan, but I don't think within the narrative of our show that kind of arc works for us. It's very, very tricky. It sounds very easy to test whether or not someone can stop a watch with their mind, but when you get into it, if all you end up with are negatives, you don't really have a television show there. Not, at least, *MythBusters.*

To some extent you need to have brief shows where you can treat something sufficiently within a single episode.

We are constrained by the time. It's absolutely true. One of the shames is the international cut of *MythBusters* is fifty-two minutes long, but the U.S. cut is forty-four minutes long, so there are eight minutes missing from every U.S. episode. Often, great jokes lose their punch lines in the edit. It's unfortunate.

The show is so popular, but how do you think people feel when you're taking away these myths and these legends from them?

> "Science teachers are among our most fervent fans. They say Thursday mornings after our show airs are some [of] their most exciting talks in their classes."

I've never gotten a complaint. Also I've never had anyone e-mail me on the positive side and thank us for all the groundbreaking work we're doing in urban legend research. I think everyone realizes that the premise of the show is an excellent scarecrow on which to hang a show that tricks you into learning about science.

We recognized early on that the structure had that sort of trick in it. We have [had] these great stories that often ended with hilarious or terrible things happening, and we got to demonstrate them, which is inherently interesting. And then there's our enthusiasm. We realize our enthusiasm is a great driver toward what the audience enjoys watching. We as communicators, both of us through totally different means, are good at communicating what we're enjoying and why we're enjoying it. That is inherently involving.

What influence do you think you've had on science communication and science education?

Science teachers are among our most fervent fans. They say Thursday mornings after our show airs are some [of] their most exciting talks in their classes. An MIT professor told us that he thought *MythBusters* was a significant reason that engineering schools, which about ten years ago often would allow people to go all the way through a PhD program doing all theoretical work on the computer, now require their grad students to do hands-on work. He believes it is in no small part due to how *MythBusters* has been part of the DIY zeitgeist that has absolutely exploded in the last five years.

It's a winning formula for you guys.

I hope so, because we want to develop some more shows for Discovery. We've just signed on for several more years of *MythBusters*. It's still rating as strong as it ever has been, actually. It's the longest-running show on Discovery, at this point. In addition, we've signed up to develop for Discovery several new shows with some business partners we have. We're really, really excited about it. We have a deck of ideas. Some very strong, some medium formed, some very loosely formed.

You've got the best job on Earth!

How did all these myths originate?

I've thought a lot about why great myths perpetuate. We all want to know how the world works. That's the natural human inclination. When a good narrative helps you understand how the world works you latch onto it. The narrative provides a mnemonic device for your brain. A meme, if you will. I think we pass those around because they're easy bites of information to pass around. Also we are storytellers. We like telling each other stories whether they're true or not. Sometimes the most elaborate stories for us provide the most lovely fodder for a myth because there are so many parts to work on.

Would you say that more of the myths you investigate happen to be true or false? What's the ratio?

Something like sixty percent of the stories are busted, and then an even split of them are plausible or confirmed. We don't care whether we bust or prove something. We're totally agnostic where that's concerned.

Has there ever been any kind of backlash coming out as a skeptic?

I've had kids e-mail me and say, "Why do you think this?" I don't respond to all of it; I'm not looking for a fight. I have occasionally written back to someone and said, "How nice for you" when they've told me I'm an idiot. But for the most part, everyone is incredibly respectful.

Do you find that most of the detractors complain about your being an atheist rather than your being a skeptic?

Actually, I get far more complaints about being an idiot than an atheist. If you troll the Discovery forums, you will find countless, countless posts of people saying we are total idiots; we have no idea what we're doing. Then the people who step up and defend us are working scientists at NASA, Sandia [National Laboratories], and [Jet Propulsion Laboratory]. All over the country working scientists are the ones knowing that we are doing the right kind of work, even if we're not doing it as rigorously as anyone, especially us, would like. The methodologies are sound.

How does it feel to be such a guardian for science and skepticism and atheism?

A guardian for science? [Laughing.]

I take the responsibility seriously. I follow my natural inclination, and the success comes from that. I follow what feels right to me. I let that guide me rather than the idea that I am a guardian or I am a voice. When you are a public figure, your job is to be truthful.

Karen Stollznow is a SKEPTICAL INQUIRER contributing editor and a skeptical investigator. She has a doctorate in linguistics and researches endangered writing systems at the University of California, Berkley.

Read Karen Stollznow's full-length *Point of Inquiry* podcast interview with Adam Savage at: **www.csicop.org/SIExtras**

[INVESTIGATIVE FILES JOE NICKELL

Joe Nickell, PhD, is CSI's senior research fellow and author of such books as *Inquest on the Shroud of Turin*, *Relics of the Christ*, and *Looking for a Miracle*.

The True Cross: Chaucer, Calvin, and the Relic Mongers

Although there is little justification in either the Old or the New Testament to support what would become a cult of relics in early Christianity, such a practice did develop. The earliest veneration of Christian relics can be traced to about CE 156 when Polycarp, the bishop of Smyrna, was martyred and his burned remains were gathered for veneration. In time, the distribution and veneration of packets of dust and tiny fragments of bone or cloth, and the like—associated with martyrs and saints—became common. At about CE 400, St. Augustine deplored the excesses and outright fraud of the relic business, disparaging "hypocrites in the garb of monks for hawking about the limbs of martyrs," adding skeptically, "if indeed of martyrs" (*Encyclopedia Britannica* 1978, s.v. "Relics").

Among other, later, critics was Geoffrey Chaucer (ca. 1340–1400), whose great unfinished work *The Canterbury Tales* contains a satirical attack on relic mongering. An even more scathing condemnation comes from John Calvin (1509–1564), the Protestant reformer, whose *Treatise on Relics* is a surprisingly modern look at the Roman Catholic Church's veneration of relics. Both Chaucer and Calvin weighed in on those most quintessentially Christian relics, fragments of the reputed Holy Cross itself. Here is a summary of their views, supplemented by my own investigations and research on the cross, which according to legend was discovered in the fourth century by St. Helena.

Chaucer's 'Pardoner's Tale'

The Canterbury Tales (ca. 1386–1400) is Geoffrey Chaucer's fictional classic compilation of stories told by traveling pilgrims, including the host of the Tabard Inn in Southwark, England, from whence said Pilgrims set out, wending their way to Canterbury Cathedral. "The Pardoner's Tale" satirizes phony relics in a classic of skepticism worthy of a brief retrospective here. The Pardoner—one who sells the church's forgiveness of sins—is a pretentious fellow, as hinted in the opening lines (in quaint Middle English):

> 'Lordynges,' quod he, in chirches
> whan I preche,
> I peyne me to han an hauteyn
> speche,
> And rynge it out as round as gooth
> a belle,
> For I kan al by rote that I telle.
> My theme is alwey oon, and ever
> was—
> *"Radix malorum est cupiditas."*

That is, as I translate it (and all that follows) into modern English:

> "My Lords," said he, "in churches
> when I preach,
> I do take pains to have a haughty
> speech,
> And ring it out as roundly as a bell,
> For I know by rote all that I tell.
> My theme's to be the same and always will
> That 'Greed is at the root of all evil.'"

But the Pardoner is merely a hypocrite. First, he displays his letters of approval signed by the Pope. Then he brings out his reliquaries, with bits of cloth and other alleged relics, including the shoulder bone of a sheep, and declares:

> "If when this bone be washed in any
> well,
> If cow, or calf, or sheep, or ox
> should swell
> From eaten worm, or by a snake's
> been stung,
> Take water of that well and wash its
> tongue,
> And it is healed forthwith; and furthermore,
> Of poxes and of scabs and every
> sore
> Shall every sheep be healed, that of
> this well
> Drinks a draft; take heed of what I
> tell."

He adds that the relic-treated water will cause farm animals to multiply and will put an end to all human jealousy, including distrust of a wife's faithfulness—even if she has lain with two or three priests! Of another ruse, he admits,

> "By this trick I've won, year by year,
> A hundred marks since I was Pardoner.
> I stand as if a cleric in my pulpit,
> And when the common people
> down do sit,
> I preach, so as you've heard me say
> before,
> And even tell a hundred falsehoods
> more."

Acknowledging his hypocrisy, he states:

> "Thus can I preach against the self-same vice
> Which I do use, and that is avarice.
> But, though I too am guilty of that sin,
> Yet can I make other folk to turn
> From avarice, and hurry to repent.
> But that is not my principal intent."

The Pardoner then goes on to tell his tale. (It features three young rogues who set out on a drunken quest to slay evil Death. An old man directs them to a spot where they instead discover a treasure of gold coins. Unfortunately they end up killing each other out of avarice and so indeed find death.)

Finished with his morality tale, the Pardoner makes a direct pitch to his host, who rails against the fraudulent relics while indicating his own belief in the relic of the True Cross. The Pardoner begins the exchange:

> "Come forth, sir host, and offer first then,
> And you shall kiss the relics every one,
> Yes, for fourpence! Unbuckle now your purse."
>
> "Nay, nay," said he, "then I'd have Christ's curse!
> It shall not be, however you beseech me.
> You would have me kiss your old breeches,
> And swear they were a relic of a saint,
> Although they're stained with your own fundament!
> But by the cross which Saint Helena found,
> I'd like to have your bollocks in my hand
> Instead of relics or reliquarium;
> Let's cut them off, I'll help to carry them;
> They shall be enshrined within a hog's turd."
>
> This pardoner answered not a word. . . .

(The Knight helps make peace between the two men, whereupon the pilgrims "rode forth on their way.")

Now, Chaucer's own view of the True Cross is unstated, but having it endorsed by his central character, a good Christian and a man of seeming integrity, suggests that Chaucer accepts the relic allegedly found by St. Helena as authentic. Nevertheless, if he does not condemn all relics outright, Chaucer does identify and disparage fraudulent relic practices. At the time when he was writing, this was a bold stance for a writer to take. Reformist John Calvin, however, writing a century and a half later, took the matter several steps further.

Calvin had much to say about the pieces of the alleged True Cross—the location of which was supposed to have been miraculously revealed to St. Helena in CE 326. Calvin suggested that "if we were to collect all these pieces of the True Cross exhibited in various parts, they would form a whole ship's cargo." He also said that there were more relics of it "than three hundred men could carry!" adding: "As an explanation of this, [the relic mongers] have invented the tale, that whatever quantity of wood may be cut off this true cross, its size never decreases. This is, however, such a clumsy and silly imposture, that the most superstitious may see through it" (233).

Figure 1. The *Titulus Crucis*, allegedly the placard on Jesus's cross as mentioned in the gospels, has now been radiocarbon tested. (Drawing by Joe Nickell)

Calvin on Relics

John Calvin's condemnation of relics is sweeping. In his *Treatise on Relics* (1543), he observes that "the desire for relics is never without superstition, and what is worse, it is usually the parent of idolatry" (Calvin 1543, 218). He is unrelenting in his withering look at relics—from the reputed Holy Blood, "exhibited in more than a hundred places" (226), to the many bogus Holy Shrouds (including today's controversial one, which was kept at Nice in Calvin's time; it wasn't transferred to Turin until 1578 [Nickell 2009, 40]).

Calvin specifically refers to the alleged fragment known as the *Titulus Crucis* (cross title board). Bearing the inscription "This is the King of the Jews," the *Titulus*—with text in Greek, Latin,

Figure 2. Purportedly, the True Cross, "discovered" in the fourth century, could replenish itself miraculously—no matter how many pieces like these, mounted in a cross reliquary in Genoa, were removed. (Photograph by Joe Nickell)

and Hebrew—was ordered by Pilate to be placed on the cross (Luke 23:38). Two churches, Calvin delights in observing, lay claim to this relic. Actually, Helena supposedly divided the *Titulus* into three pieces, only one of which now remains—kept, as Calvin noted (234), in Rome's Church of the Holy Cross.

Modern science has validated Calvin's skepticism of the *Titulus*. First, the artifact contains a number of anachronisms and other problematic elements that indicate it is a probable forgery (Nickell 2004). For example, although the Hebrew (or Aramaic) letters are correctly written from right to left, so—incorrectly—are the Greek and Latin lines. Based on my research on the history of writing, as soon as I saw this error (See my drawing, figure 1), I thought it a *prima facie* indication of spuriousness. (See my *Pen, Ink, and Evidence* [Nickell 1990].)

Another paleographic error is found in the Greek line. Although it is written in mirror-image fashion from right to left, one letter—the *z*—is not reversed. This further emphasizes the problematic nature of the writing and suggests that the writer may not have been familiar with the ancient languages. Unless we accept the rationalizations of the *Titulus*'s defenders (Thiede and d'Ancona 2000, 96–100), spelling errors also cast doubt on the inscription. Another doubtful feature is the letters having not just been painted but first incised into the wood—a seemingly gratuitous enhancement—whereas one would instead expect a hastily prepared placard intended to be used quickly and then discarded.

Indeed, such suspicions are confirmed via radiocarbon dating. A sample of the walnut wood (*Juglans regia*) was taken from the back of the slab, cleaned to remove any contamination, and then subjected to the carbon-dating process. Control samples of varying ages were also included to confirm the accuracy of the process. The tests on the *Titulus* revealed that it was made between CE 980 and 1146 (Bells and Azzi 2002)—a date range incompatible with its alleged first-century origin, but consistent with the period (1144–1145) when the artifact was apparently acquired (Nickell 2007, 86–90).

The Fragments

Over the years I have encountered pieces of the alleged True Cross (figure 2), together with the pious legends of their acquisition. In my own collection are a pilgrim's token of the True Cross (reputedly made in the seventh century by mixing clay with some ash from a burned piece of the cross) and a small bronze Byzantine cross of about the same time period (Nickell 2007, 79, 93). The latter was a legacy of Constantine the Great (274–337), who made Christianity the Roman Empire's official religion after having a miraculous vision of a flaming cross in the sky—a vision, as doubtful as it is, of late vintage (Nickell 2007, 77–79).

It is another reputed vision—that of Constantine's mother, Queen Helena (later St. Helena)—to which is attributed the finding of the True Cross. In 326, nearly three centuries after the crucifixion, Helena went to Jerusalem where she allegedly discovered the site of the cross's concealment, supposedly with divine inspiration: either by heavenly signs, dreams, or the guidance of a

Jew named Judas. In fact, she supposedly located, beneath rubble, three crosses—supposedly of Jesus and the two thieves crucified with him (Matthew 27:38)—but was unable to distinguish which was Jesus's own. Each cross was then tested on a mortally ill woman, and one—according to the fanciful legend—miraculously healed her, thus proving it was the *Vera Crux*, the True Cross.

Supposedly a portion of the cross was given to Constantine, while another was taken to Rome. The main portion remained in the custody of successive bishops of Jerusalem; it was captured by Persious in 614 but then victoriously returned in 627. Finally, in 1187 it was lost forever, after crusading Franks occupied Jerusalem.

Nevertheless, alleged fragments of the True Cross and Roman nails from the crucifixion proliferated. As early as the mid-fourth century, St. Cyril of Jerusalem (ca. 315–386) wrote that "already the whole world is filled with fragments of the wood of the Cross." From the fifth century on, a "cult of the Cross" developed and churches were erected in the True Cross's name. In a letter, St. Paulinus of Nola (353–431) dared to explain (and Calvin would later satirize, as we have seen) the claim that, regardless of how many pieces were taken from the cross, it never diminished in size—a "fact" that has been compared with Jesus's miracle of the multiplying loaves and fishes (Cruz 1984, 39).

In Turin in 2004, I was able to view a purported piece of the True Cross, set in a cruciform reliquary (along with a purported relic of the Holy Blood). The lighted reliquary is the focal point of a relic chapel—the crypt of the Church of Maria Ausiliatrice—which contains a fabulous collection of some five thousand relics of saints, exhibited in seemingly endless panels and display cases along the walls. Included are relics alleged to be from Mary Magdalene and, more credibly, St. Francis of Assisi.

In 2009 in Genoa I saw no fewer than four pieces of the "True Cross" arrayed in an elaborate reliquary cross (figure 2). The fragments were specifically claimed to be from the True Cross—or so "tradition has it." (Translation: "This is only a handed-down tale.") Known as *Croce degli Zaccaria* (or "cross of the Zaccaria"), it was formerly owned by a family of that name, who were among the major merchant traders of the eastern Mediterranean when Genoa was at its commercial and political peak. The reliquary was reportedly first commissioned in the ninth century, then remade in its present form (again see figure 2) between 1260 and 1283—a gilt and bejeweled cruciform artifact now displayed in the Museum of the Treasury of the Cathedral of San Lorenzo (St. Lawrence) of Genoa (Marica 2007, 6; "Museum," n.d.).

Again, the lack of any credible provenance (its traceability to some known point)—together with the incredible proliferation of such fragments and even the suspicious neatness of these four pieces of the "True Cross"—makes the *Croce degli Zaccaria* a piece to be entirely skeptical of, not revered.

Conclusion

There is no credible evidence that Helena, or anyone, found Jesus's cross (with or without accompanying crosses of the two thieves) in the fourth century—or at any other time for that matter. The provenance is laughable. Even more so is the absurd tale of its miraculousness: its infinite ability to restore itself, no matter how many pieces were taken from it.

The proliferating pieces of the True Cross have been rivaled for outlandishness by many other bogus relics—such as over forty shrouds of Jesus and multiple corpses of Mary Magdalene (Nickell 2007, 40, 116). Geoffrey Chaucer and John Calvin were justifiably critical of relic hucksterism in their respective times, and we—with our modern scientific means of analysis, such as radiocarbon dating—must be no less so. ■

Acknowledgments

I am grateful to my many Italian friends—notably Massimo Polidoro, Luigi Garlaschelli, and Stephano Bagnasco—for helping make possible my visits to many relic sites in Italy. At the Center for Inquiry, Director of Libraries Timothy Binga assisted as usual with research. Financial assistance came from John and Mary Frantz and the Committee for Skeptical Inquiry, whose executive director is Barry Karr. I also want to express my gratitude to Paul Kurtz and his Prometheus Books for publishing John Calvin's *Treatise on Relics* and inviting me to write the introduction. To the many others who help make such investigations possible: CFI staff, donors, friends, and family—especially my wife, Diana Harris—I express my sincerest thanks.

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How to Make a Monster!

The Legend of Creating Artificial Life: From the Golem to Pinocchio

Everyone knows the tragic tale of Victor Frankenstein, the man who, in the 1818 novel by Mary Shelley, succeeded in bringing back to life a corpse, only to immediately lose control over it. But the human dream of creating artificial life goes far beyond the creature that terrified Victorians.

This dream belongs to the Roman poet Ovid, whose short story "Metamorphosis," dating back to 8 CE, tells the story of Pygmalion, King of Cyprus, who modeled a female statue in ivory. He called her Galatea and fell in love with her, considering the statue to be well above any flesh and blood woman. Pygmalion ended up praying to Aphrodite to let him marry the being he had created, and the Goddess relented. Ovid tells how Pygmalion saw his statue slowly coming to life, breathing, and opening her eyes.

With his story, Ovid meant to underscore the devotion of the artist to the product of his work, which can go as far as identifying oneself in it. Ovid did not imagine that he was writing the prototype of many modern science-fiction tales!

Creatures without Control

Much older than Ovid's Galatea, however, is the figure of the golem, a sort of giant created by magic in Jewish mythology who first appears in the Bible. Jews link the word *gelem* ("raw material"), which appears in the Old Testament (Psalm 139:16), to the figure of Adam before life was infused into him.

In classic tradition, the golem is a strong and obedient creature made of clay that a rabbi can activate for servitude just by writing on his forehead a word meaning "God is truth." By erasing one of the letters of this word, the word that remains means "God is dead," and the golem stops.

In a version of this tale set in seventeenth-century Poland, of which traces can be found in a letter dated 1674, a golem became an unstoppable menace for his master. The master, Rabbi Elija Ba'al Schem from Chelm, asked the golem to take off his shoes; when it kneeled down, the clever Rabbi wiped the word *life* from the creature's forehead. The golem then died, but he fell upon the rabbi and killed him.

The most famous version of the story, however, dates from the eighteenth century and is set in Prague's ghetto. Here, the golem—created by beloved Rabbi Jehuda Löw Ben Bezalel at the beginning of the seventeenth century—was a defender of the Jewish people from persecutions and anti-Semitic pogroms. The rabbi, however, lost control over the golem, and it began to destroy everything it met. Once the rabbi regained control over the situation, he decided to deactivate the golem and hide it in the attic of Prague's Old-New Synagogue, in the heart of the old Jewish quarter, where—according to the legend—his body still rests today. (Czech investigator Ivan Mackerle went searching for the golem's body in the roof space of the synagogue but couldn't find anything useful; his interesting report can be found in *Fortean Times* 238, July 2008).

Androids and Humunculus

Other examples of artificial creatures with human-like features can be found in Greek mythology as well. Cadmus, founder of Thebes, buried dragon's teeth, which transformed into soldiers. Hephaestus, god of metalwork, created mechanical slaves, ranging from girls made of gold and with a sentient mind to three-legged tables that could move by themselves.

Inuit legends tell of the Tupilaq, an avenging monster created by a wizard to hunt and kill an enemy. But the Tupilaq can be a double-edged sword, for a victim who knows magic can stop the creature and turn it back on its creator.

In the fourteenth century, philosopher, theologian, and scholar Saint Albertus Magnus was the first to use the word *android* to define living beings created by man through alchemy. According to legend, Albertus was able to build a real android made of metal, wood, wax, and glass. He gave it the power of speech and used it as a servant at the Dominican monastery of Cologne.

It was in the Middle Ages that technology allowed people to not only imagine but to build the first mechanical automatons, which were mainly

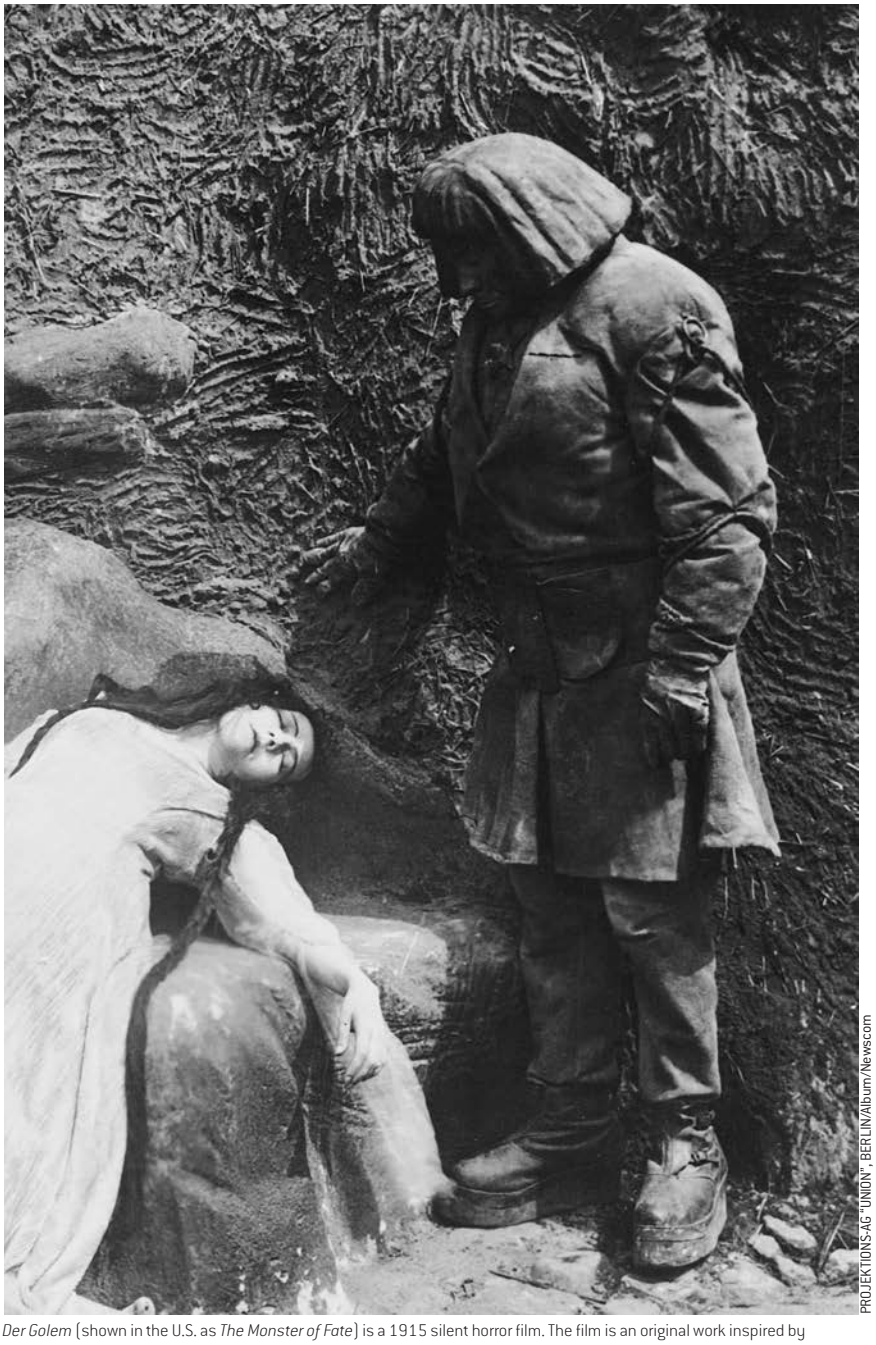
moving dolls used to embellish bell towers and churches. Even Leonardo da Vinci showed interest in the subject; project plans dating to about 1495 show a mechanical knight in armor. In da Vinci's plans, the figure should have been able to stand up; move his arms, head, and jaw; and emit sounds from his mouth due to a complex percussion mechanism hidden in his chest. It is possible that the mechanical knight was just an idea da Vinci drew up for Duke Ludovico Sforza, for whom he worked at the time, to liven up parties at the Sforzesco Castle in Milan. Nobody knows if it was ever built.

It was only in the eighteenth century that automatons became sophisticated figurines able to write, dance, do magic tricks, perform acrobatics, and play chess and musical instruments. However, even then they were just mechanical creatures controlled by man without a will of their own—unlike the homunculus, which according to alchemical tradition was a real human being created in vitro. Paracelsus, the Renaissance alchemist, went so far as to write a recipe for creating a homunculus. The recipe began with a man's semen, which was left resting for forty days in a vial kept warm by a horse stomach and fed with human blood. After forty weeks the contents of the vial would supposedly transform into a real boy—complete and perfect but smaller than a human baby and, like the golem, lacking a soul.

Frankenstein and Pinocchio

At the start of the nineteenth century, the Industrial Revolution was in full swing. Taking inspiration both from the experiments of Luigi Galvani (who used electrical arcs to induce movement in a corpse) and from the golem story, in 1818 Mary Wollstonecraft Shelley anonymously published her celebrated gothic novel *Frankenstein, or the Modern Prometheus*. It's the story of a Swiss scientist, Victor Frankenstein, who, shocked by the death of his mother, cultivates an impossible dream: creating an intelligent human being with perfect health

In the Middle Ages technology allowed people to not only imagine but to build the first mechanical automatons.



PROJEKTIONS-AG "UNION", BERLIN/Album/Newscom

Der Golem (shown in the U.S. as *The Monster of Fate*) is a 1915 silent horror film. The film is an original work inspired by ancient Jewish legend.

With a stroke of fantasy that still warms the hearts of children today, Carlo Collodi imagined in 1883 that a block of wood could take on life and transform into a boy, Pinocchio.

and a long life. Frankenstein's illicit studies, which include dissecting corpses stolen from cemeteries, allow him to obtain the knowledge necessary to turn his dream into reality. But the creature, deformed and with superhuman strength, escapes his creator.

Even more so than the golem, then, the figure of Frankenstein (a name often misapplied to the monster itself) became a real modern myth, drawing his mythical power from the fear that technological progress can escape man's control. It is no surprise, then, that many consider *Frankenstein* the first true science-fiction novel.

Throughout the 1800s, there were stories and novels telling of unusual mechanical or artificial creatures. In "Sandman" (1815), writer E.T.A. Hoffmann told the story of a love between a man and a mechanical doll. *The Steam Man of the Prairies* (1815), a dime novel by Edward S. Ellis, is about a big mechanical steam man used to carry coaches across prairies.

Luis Senarens, known as the "American Jules Verne," in 1885 imagined the first mechanical man activated by electricity in his book *Frank Reade and His Electric Man*. The following year, Frenchman Mathias Villiers de l'Isle-Adam first used the word *android* in a novel, *L'Eve Future*, in which he imagined inventor Thomas Edison creating an almost perfect artificial woman.

Even in my country of Italy, the subject has fascinated our literati. Ippolito Nievo, in his 1860 novel *Storia Filosofica dei Secoli Futuri* (*Philosophical History of Future Centuries*), imagined that in the future there would be "man-machines," which he labeled an invention "that surpasses anything man has ever imagined." Much more modestly, but with a genial stroke of fantasy that still warms the hearts of children today, Carlo Collodi imagined in 1883 that a block of wood could take on life and transform into a boy, Pinocchio. It's true that *Pinocchio* is a fairy tale, but the story contains all of the fundamental elements of future tales about androids (including Steven Spielberg's sci-fi movie *A.I.: Artificial Intelligence*).

Robots and Androids

It wasn't until 1921 that the very first true robots made their appearance in the three-part drama by Czech author Karel Čapek titled *R.U.R.* (*Rossum's Universal Robots*). These robots (more properly androids because they have human features) are the product of Rossum's factory and are used as low-cost laborers. The dream of the owner of the factory is to free the human race from slavery and physical work, but the effects are catastrophic. Humanity reacts by embracing all sorts of vices and idleness, allowing robots to take control and aim for inevitable human extinction.

But if *R.U.R.* was the first to introduce the word *robot*, the most famous android of the 1920s certainly is femme-bot Maria from Fritz Lang's film *Metropolis* (1927). The complex plot devised by Lang, set in a disquieting future world with strong class separation, sees Maria as an evil creature who creates dissent among the masses in revolt.

Although certainly the most famous, Lang's robot was not the first mechanical android in cinema. That medal goes to magician Harry Houdini, who in 1919 introduced one such creature in his cliffhanger serial for the cinema titled *The Master Mystery*. Here, the robot, called Automaton, is at the service of a criminal gang against whom Houdini, star of the series, has to fight. By the end of his adventures, Houdini is able to destroy the armor of the robot and discover—hidden inside the robot—the boss of the gang. It was, then, a half robot. Or perhaps it could have been called a *cyborg*: a cybernetic organism made of both artificial and biological parts.

From the 1930s on, the idea of the automaton, the robot, or the replicant artificially created by man has become very popular and is constantly seen in sci-fi novels and films. From the many books about robots by Isaac Asimov to movies like *Westworld*, *Star Wars*, *Terminator*, *Blade Runner*, *Alien*, *RoboCop*, *Star Trek*, and so on, the subject has never lost its appeal. It will certainly continue to fascinate people, at least until the day when robots become so common that nobody takes notice of them anymore. If such a day ever comes, that is.

[THINKING ABOUT SCIENCE MASSIMO PIGLIUCCI

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The Wired Future of Humanity

I devoted my previous "Thinking about Science" column to recent claims that the Internet is seriously affecting our mental health. This time, I'm going to talk about claims that the Internet is going to be the future of our mental health! One such claim comes from *New York Times* writer Robert Wright (author of *The Evolution of God*). In a recent column ("Building One Big Brain," July 6, 2010), Wright welcomes a forthcoming book by former executive editor of *Wired* magazine Kevin Kelly, titled *What Technology Wants*.

Wright begins by asking a fairly odd question: Is technology really about us? To which I respond, how can it *not* be about us, since we are both the creators and consumers of technology? What Wright means is that "technology is weaving humans into electronic webs that resemble big brains—corporations, online hobby groups, far-flung N.G.O.s. And I personally don't think it's outlandish to talk about us being, increasingly, neurons in a giant superorganism."

Well, it may not seem outlandish to Wright, but does it make any sense? The superorganism metaphor is used by some biologists to indicate natural entities that are made of what we would normally consider individual organisms, yet they also act as a unit in some meaningful (and scientifically explorable) sense. Colonies of eusocial insects are the classic—though by no means only—example: the workers in an ant colony are organisms by any reasonable definition of the term, yet they sacrifice their own reproductive fitness for the benefit of the fitness of the queen. These kinds of situations were at one point considered a serious challenge for Darwinian evolutionary theory, but they have been brilliantly accounted for by work (pioneered by British biologist W. D. Hamilton) that explores the unusual reproductive systems of these insects. It turns out that workers are more closely related to the queen's offspring than they would be to their own—hence the evolution of their instinct to help the queen maximize her (and the colony's) reproductive output.

Can human brains loosely connected to each other via Internet websites in any meaningful sense be thought of as cells in a superorganism, analogous to workers in an ant colony? If so, I haven't encountered any articulate reason for it, other than the catchiness of the metaphor itself. But things get significantly worse from this shaky starting point.

Wright goes on to articulate the main reason he thinks the Internet-as-superorganism metaphor actually makes sense: "Could it be that, in some sense, the point of evolution—both the biological evolution that created an intelligent species and the technological evolution that a sufficiently intelligent species is bound to unleash—has been to create these social brains?" In a word: no. It couldn't be, unless evolution were what philosophers call a teleological phenomenon: a process that actually aims at a particular goal to be achieved through mechanisms such as natural selection, mutation, etc. (I would note in passing that we also have no good reason to assume, based on a sample size of exactly one, that "sufficiently intelligent species" are "bound" to unleash technology. But that's another story.)

Teleology immediately leads to the postulation of intelligent design, a possibility that—when we are talking about the laws of nature themselves—equally unavoidably means supernatural intelligent design, arguably the most antiscientific concept ever proposed. Wright realizes that what he calls "card-carrying Darwinians," among which he includes himself, might have a problem with that. Indeed, he has debated both Daniel Dennett and Steven Pinker on this very topic. Yet he seems largely unperturbed by his arbitrary mishmash of naturalism and teleology. It's not that teleology is impossible *a priori*, mind you, but it is such a profoundly un-naturalistic view that those who take it seriously ought to be prepared to mount a solid argument backed up by plenty of evidence. Extraordinary claims and all that, you know.

I bring up Wright's bizarre views not because they are intrinsically interesting but rather because they are yet another example of an intellectual, articulate writer falling for a simplistic metaphor and running with it in the pages of the premier national newspaper. Skeptics have an easy time debunking the nonsense being thrown right and left in the media and populating the ever-expanding bookstore spaces devoted to spiritualism, religion, and "alternative" worldviews. It is much harder to account for why smart people engage in some serious mental gymnastics to deny the conclusion that there is no point to evolution. Neither we nor the Internet, and certainly not fantastically hypothetical human-Internet superbrains, are why the dinosaurs went extinct and Lucy started to walk on two limbs. There is no "why," only the endlessly fascinating "how."

[SKEPTICAL INQUIREE BENJAMIN RADFORD

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Infrared Cameras and Ghost Hunting

Q: I recently saw an episode of the "reality" TV show *Ghost Hunters*, and the T.A.P.S. team used an infrared camera to look for ghosts. At one point a camera captured a form in the general shape of a person near a wall—but everyone is accounted for and the ghost hunters see nothing except via the camera. Any idea what that was?

—C. Kalscheur

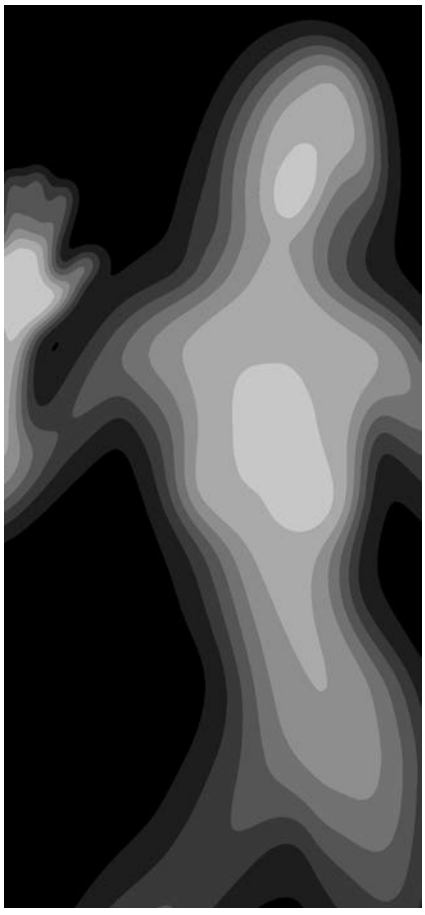
A: *Ghost Hunters* is the world's top ghost-themed television show, and it has been misinforming the public about both ghosts and science for six seasons (see "Ghost-Hunting Mistakes: Science and Pseudoscience in Ghost Investigations" on page 44 of this issue). The *Ghost Hunters* team prides itself on using modern technology to detect ghosts and other paranormal phenomena, and infrared cameras are among their staple devices. Like the other scientific gear that ghost hunters employ, infrared cameras are valid and useful devices when used correctly.

More often than not, infrared cameras create false-positive readings that amateur ghost hunters mistake for ghostly activity. Without seeing the specific video clip that you are referring to, it's impossible to know exactly what was recorded, but in my years of ghost investigations I have encountered many similar readings. To uninformed audiences and unscientific investigators, the fact that an infrared camera reveals a human-shaped form where clearly no one is around can seem very spooky and mysterious. There is, however, often a perfectly rational and scientific explanation.

The first step to explaining the nature of these "ghostly auras" is understanding the nature of the electromagnetic spectrum. Visible light—the light that our eyes can see—makes up only a fraction of the electromagnetic waves in the world. The next-lowest category of frequency below visible light (and above radio waves and microwaves) consists of infrared electromagnetic waves. In a nutshell, infrared cameras simply allow us to see a lower-frequency wavelength, detecting variations in heat instead of light.

Heat is of course far less transient than light; if we turn off a light switch in a closed room, the area goes dark almost instantly. But if we turn off a source of heat—including body heat—in an area or room, the heat may remain long after the source has been removed. This can seem mysterious to amateur ghost hunters.

At an investigation I carried out last year for the TV show *MysteryQuest*, one of the ghost hunters used a forward looking infrared (FLIR) camera to detect a foot-long vertical warm spot on a pillar. No one in the room could explain what caused it; one person suggested it was a sign that a ghost had been watching us. In fact I had seen one of the ghost hunters leaning against the pillar a few minutes earlier, and the warm spot matched exactly the height and shape of the man's upper arm. All the ghost hunters swore that none of them had leaned against the pole, but when I suggested they review a video tape, they saw I was correct. If they had not been recording that area (or if I hadn't seen the investigator create the warm spot), it likely would have remained mysterious. This is quite common on TV ghost-hunting shows, and it is likely the explanation for what you saw.



"Psychic Vibrations" has appeared in the Skeptical Inquirer for the past thirty years. Sheaffer is also author of *UFO Sightings: The Evidence* (Prometheus 1998). His website is www.debunker.com.

Hovering UFO Closes Chinese Airport

Sightings of alleged UFOs occur pretty often, but it's rare indeed for one to affect scheduled air traffic. We should not be surprised, then, to find that such an event has made the news. What was the mysterious object that allegedly hovered over Hangzhou's Xiaoshan Airport, China's ninth-busiest, on the evening of July 7, 2010? At about 8:40 PM local time, a UFO was reported by a flight crew that was preparing to land. As a precaution, flight controllers delayed or redirected eighteen flights.

As is often the case, conflicting and confusing accounts of the UFO incident make it difficult to determine exactly what happened. Reporters want an exciting story, and UFOlogists want to win converts. They will typically grab onto any photo or video that is supposed to represent the object and report as fact practically any claim that is made regardless of its source or veracity. Many images of the alleged airport UFO—images that were supposed to show the UFO over Hangzhou but obviously showed a different object—soon began circulating in news stories and on the Internet. Most frequently seen is an impressive-looking rectangular object, from which a beam of light shines out underneath (see the accompanying news report at http://tinyurl.com/273h68h). At first I thought the image was the reflection of an interior fluorescent light fixture, as may be seen when looking out a window. After studying the other photos in this series and reading some of the online discussions, I agree that it's probably an exposure of a few seconds showing a helicopter with flashing lights, shining a searchlight on the ground. In any case, because these photos were posted to the Internet a year before the sighting, they obviously have nothing to do with the July 7 incident. Other photos accompanying news accounts of this incident show a rocket launch, probably that of the Russian Progress M-06M supply ship launched to the International Space Station on June 30.

Photo: Metro Express

One of several published images purportedly showing a UFO over Xiaoshan Airport. This image appears to be a long-exposure photograph of a police helicopter with a searchlight beam shining down. It was posted to the Internet long before the incident at Xiaoshan.

However, it is significant that the brilliant Venus in the evening sky at that time, was nearing its maximum brightness before setting about two-and-a-half hours after the sun. One would think it impossible for a group of educated and seemingly rational people to mistake the brilliant planet Venus for a UFO, but experience shows otherwise. "No single object has been misinterpreted as a 'flying saucer' more often than the planet Venus. The study of these mistakes proves quite instructive, for it shows beyond all possible dispute the limitations of sensory perception and the weakness of accounts relating shapes and motions of point sources or objects with small apparent diameters," wrote the well-known pro-UFOlogist Jacques Vallee in his 1966 book *Challenge to Science*.

A brief video snippet of the "UFO" about twenty seconds into a Chinese-language news report on the incident shows a tiny, bright dot against a dark sky (see http://tinyurl.com/2c9ft7o). It might be a camcorder image of Venus, although the slight fuzziness on the left side may possibly result from an off-axis image. Alternatively, it might instead show the plumes of a distant rocket launch. Without more informa-

tion, we cannot say for sure. Officials said that the object did not turn up on radar. Ruan Zhouchang, spokesperson for the Xiaoshan Airport in Hangzhou, said through an interpreter, "There was an unknown object seen in the skies over the airport. So according to our regulations we had to close the airspace. Aircraft movements were suspended from 8:45 PM to 9:41 PM." However, the photo accompanying that news report, supposedly showing the object, appeared to be that of a high-altitude contrail (see http://tinyurl.com/2vd2zuz).

A 2001 incident occurring at the Barnaul Airport in southern Siberia sounds very much like the incident at the Xiaoshan Airport. The Agence-France Presse reported from Moscow on January 27, 2001:

> An airport in southern Siberia was shut down for an hour and a half on Friday when an unidentified flying object (UFO) was detected hovering above its runway, the Interfax news agency reported. The crew of an Il-76 cargo aircraft of the company "Altaï" refused to take off, claiming they saw a luminescent object hovering above the runway of the [*sic*] Siberia's Barnaul airport, local aviation company director Ivan Komarov was quoted as saying.

As in Hangzhou, nothing appeared on the radar. UFO investigator Eric Maillot—from the Cercle Zetetique, a French rationalist organization—looked into this case. He discovered that the time and direction of the UFO matched the position of Venus. And because the crew reported seeing just one bright object, not two, Maillot concluded that the "UFO" reported by the crew *was* Venus and not some separate object (www.ufologie.net/htm/afp270100.htm).

An official investigation by Chinese aviation experts was launched into the incident at Xiaoshan Airport. They concluded that the object probably was "an airplane on descent reflecting light" (see http://tinyurl.com/2bw272q), one which apparently kept descending for an hour or more. They said it might also have been an "unexpected flying vehicle," whatever that is. Imagine how embarrassing it would be to have to conclude, "Air Traffic Controllers at one of our major Chinese airports mistook Venus for an unknown hovering aircraft."

Whatever may or may not have hovered above Hangzhou, a feverish UFO excitement seemed to grip the region. On July 14, from about 8–9 PM, a UFO was reported in Shaping Park in Chongqing. This sighting also sounds very much like Venus. But according to the Chinese newspaper *Southeast Express*, at about 11:30 PM on July 9, two men in Xiamen reported seeing "dozens of vertical luminous beams" in the sky. According to one witness, identified only as Mr. Wang, "At first, there were only five of them, hanging very low in the sky, but after a short while, the number increased to about fifty, and they were higher and higher, just like a stave hanging in the sky." The story was accompanied by an impressive-looking photo showing hovering yellow lights in a mostly-cloudy and not-yet-dark sky (see www.whatsonxiamen.com/news13305.html), but it's not clear if the illustration is supposed to be an actual photo of the incident or a reconstruction using photo editing software (even if claimed otherwise, it's probably the latter).

Several explanations for this sighting come to mind. Witnesses may have seen a display involving searchlights or lasers from a distance. I witnessed once—and only once, in my many years of sky-gazing—a rare phenomenon of a mock-Jupiter, essentially the same thing as a mock-Sun or "sun dog," which looks like a vertical ribbon hanging in the sky. I glimpsed it only briefly before an approaching front of cirrus clouds covered it. Possibly the witnesses may have seen a very rare phenomenon of that sort, although I suspect that the clouds containing the ice crystals that were creating the phenomenon would have obliterated the sky before the object count got to fifty. Or, since this account contains very few details and does not contain the full name of any witness, the whole story may be made up. Such are the circumstances one often encounters when one starts to critically investigate UFO claims.

One would think it impossible for a group of educated and seemingly rational people to mistake the brilliant planet Venus for a UFO, but experience shows otherwise.

* * *

In the July/August issue of the SKEPTICAL INQUIRER, I reported on the stinging comments made by James Carrion when he resigned as head of MUFON, the largest UFO group in the United States. He described the UFO phenomenon as being based in "humans deceiving humans," which is no less than rank heresy to the mostly hardcore UFOlogists in MUFON, to whom UFOs must be extraterrestrial spacecraft. Now Carrion has announced the formation of the *Center for UFO Truth* (CUT), which according to him is "not a UFO organization nor is it affiliated in any way with Ufology. Instead CUT is a historical research organization focused on examining the question long ignored by historians: was the UFO subject purposely created by the United States and its allies as part of a cold war operation and perpetuated to this day for national security reasons?" (see http://tinyurl.com/UFOtruth).

Almost as soon as this announce-

ment hit the Internet, some of UFOlogy's wolves started howling at Carrion, as he described in his next blog posting, "Blasphemy Will Get You Stoned." He also relates what happened when he presented his theory of psi-war UFO deception at the UFO Crash Retrieval Conference in Las Vegas in 2009. "I realized that presenting a human theory for the origin of UFOs at a UFO conference is tantamount to blasphemy."

I don't think that Carrion is going down the right path here. I don't see how the CIA could have manipulated Kenneth Arnold, Ray Palmer, and the other founding fathers of UFOlogy, or why they would want to. I think that the UFO subject owes its existence not to spy wars but primarily to processes that Charles Mackay described in his book *Extraordinary Popular Delusions and the Madness of Crowds*. However, it is entirely possible that some governments (including our own) may have exploited the public's existing belief in UFOs for their own ends. I commend Carrion for having the courage to go his own way, and I wish him well. Even if his journey doesn't lead to "UFO truth," I'm sure he'll turn up some interesting stuff along the way.

By a very interesting coincidence—if it *is* a coincidence (cue sardonic laughter)—a book just published in the United Kingdom makes the same kind of argument as Carrion: that the U.S. government has been secretly *promoting* belief in UFOs. This goes against the conventional UFOlogy belief that the government is trying to cover up the existence of UFOs. Mark Pilkington, a writer and filmmaker living in London, is author of *Mirage Men: A Journey into Disinformation, Paranoia, and UFOs*. According to the publisher's blurb, "*Mirage Men* explores the strange and symbiotic relationship between the U.S. military and intelligence agencies and the community who believes strongly that UFOs have visited earth." The review in the U.K.'s *Daily Mail* says, "According to Pilkington, the campaign to promote the idea of UFOs was masterminded in the Fifties by the head of the CIA, Allen Welsh Dulles. More recently, many of the leaked fake documents and bogus stories seem to have come from the U.S. Air Force's Office of Special Investigations (AFOSI)" (see http://tinyurl.com/28oknqb). Of course, by the 1950s, flying saucers had already promoted themselves quite effectively to the public without any help from the government, and Pilkington's claim that the famous UFO contactee George Adamski was a victim of CIA deception—complete with alien impersonators in fake saucers—is implausible in the extreme.

Still, it is undeniable that one of the early directors of the National Investigations Committee on Aerial Phenomena (NICAP), the most influential UFO group of the 1950s and '60s, was Roscoe H. Hillenkoetter, who was also the first director of the CIA. Another early NICAP director was former CIA "psychological warfare" chief Colonel Joseph Bryan III, and there were at least two other NICAP directors in the CIA (see http://tinyurl.com/NICAP-CIA). Were UFOs just a personal interest of theirs, or were UFOs related to their CIA work? Enough persons with a CIA or other intelligence background have turned up in UFO circles over the years to make the question an interesting one. Even the well-known skeptical believer, the late Karl Pflock, was a former CIA man.

These men should not be confused with what seems like a small army of deceivers and impostors who claim to have intelligence and/or a military background that turns out to be simply made up. For example, a man originally known only as "Source A," who claimed to be a high-ranking Navy officer, gave "confirmation" of tales of U.S. military officials meeting with extraterrestrials. He was recently identified as Richard Theilmann, an impostor who apparently never served in the Navy; he wore a chest full of medals that he never earned (see http://tinyurl.com/SourceA).

More puzzling is the confession of UFOlogist William Moore, co-author of *The Roswell Incident* and *The Philadelphia Experiment*, who famously told the audience at a MUFON conference in 1989 that he had been recruited by intelligence agencies to spy on the somewhat unhinged UFOlogist, the late Paul Bennewitz. If Moore is telling the truth, this supposed spy mission makes no sense. If he's not, why would he make up a story that has caused everyone in UFOlogy to revile him? Of course, that assumes that Moore was acting rationally, and in UFOlogy rationality is often in short supply. ■

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Features include photos, guest-authored articles from key figures in today's skeptical movement, introductions and successes of skeptics' groups, reports from events and conventions, news of investigations, updates on developing stories, matters of concern to the skeptical community, legislation and policies to keep an eye on, links to media stories featuring CSI members, and more.

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[SCIENCE WATCH KENNETH W. KRAUSE

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Life after JCVI-syn1.0

'New' Adventures in Media Coverage, Politics, National Security, and—Oh, Yes—the Promise of Synthetic Biology

J. Craig Venter is no stranger to success—or to glitzy headlines in the popular press. By 1995, the "bad boy" of molecular biology had overwhelmed his critics by becoming the first person to decode an entire genome, that of *Haemophilus influenzae*. Then, as part of a larger goal to distinguish life's minimal genome, he did it again, sequencing the bacterium *Mycoplasma genitalium*.

Perhaps most memorably, Venter effectively humiliated the U.S. government in 2000 by winning the race to unravel and sequence a rough draft of the human genome, sixty percent of which turned out to be his own. He and his privately funded team at Celera Genomics accomplished this feat using their new and, to that point, much maligned "shotgun" sequencing method that, in the end, allowed them to expose the chain more accurately and less expensively than the simultaneous $3 billion National Institutes of Health (NIH) project led by Francis Collins.

Then, in 2007, Venter stunned the world yet again when he transformed one life form, *Mycoplasma capricolum*, into another, *Mycoplasma mycoides*, by transferring the latter's native genome into the former's evacuated cell. But Venter wasn't one to rest on his laurels. A year later, he and his twenty-member "dream team" at the J. Craig Venter Institute came astoundingly close to actually creating life by constructing *M. genitalium*'s entire genome from scratch. In his enlightening if somewhat self-gratifying autobiography, *A Life Decoded*, Venter revealed his grand designs:

> I now want to go further. My company, Synthetic Genomics, Inc. [SGI], is already trying to develop cassettes—modules of genes—to turn an organism into a biofactory that could make clean hydrogen fuel from sunlight and water or soak up more carbon dioxide. From there I want to take us far from shore into unknown waters, to a new phase of evolution, to the day when one DNA-based species can sit down at a computer to design another. I plan to show that we understand the software of life by creating true artificial life.

Given his record, one has to believe Venter will eventually accomplish every bit of it. Indeed, in connection with his latest conquest of the popular headlines, Venter, along with project co-leader Daniel Gibson and their colleagues at the Venter Institute, came at least one colossal step closer to doing so. On May 20, 2010, they announced the "Creation of a Bacterial Cell Controlled by a Chemically Synthesized Genome" in the online version of the prestigious journal *Science*. Their formal report, with the same title (by Gibson, et al.), then was quickly published in the July 2 issue of *Science*. Their ambitious project was funded primarily by SGI, to the tune of $40 million.

Venter's "new" cell consisted of two components. The donor was a 1.08-million-base-pair chromosome digitally synthesized from the natural *M. mycoides* blueprint—but with a few crucial changes. The recipient was an *M. capricolum* shell and cytoplasm. The cell's progeny, capable of continuous self-replication, demonstrate the expected phenotypic properties and thus appear to be controlled solely by the donor's synthetic genome. More than a billion daughter cells later, a strain of *M. mycoides* austerely christened JCVI-syn1.0 now awaits regeneration in a Maryland freezer.

So, exactly what has Venter achieved this time? Certain popular headlines have misstated the feat rather wildly. *Popular Mechanics* called it the "first synthetic cell." *New Scientist* termed it an "immaculate creation." Refusing to be outdone, the *Wall Street Journal* and the *Guardian* celebrated the creation of a "synthetic organism" and a "synthetic life form," respectively.

In a thoughtful opinion piece in the May 27 issue of *Nature*, however, eight diversely situated yet highly respected experts on synthetic biology attempted to clarify the situation. Some focused on the essential facts. Harvard geneticist George Church, for example, differentiated the creation of life from the synthesis of DNA by way of a vivid analogy: "Printing out a copy of an ancient text," he said, "isn't the same as understanding the language." More skeptical yet was Reed College profes-

sor of humanities, Mark Bedau, who rejected even the less ambitious claim of having created a synthetic cell. Venter's new bacterium, he argued, is just a cell with a prosthetic genome accounting for only 1 percent of the organism's dry weight.

Others were more philosophical and reflective. Arthur Caplan, bioethicist at the University of Pennsylvania, announced quite optimistically that Venter has begat "an end to a debate about the nature of life that has lasted thousands of years." JCVI-syn1.0, Caplan contended, seems to "extinguish" all vitalist views, including religious claims, that life requires some "special force or power"—other than human ingenuity, that is—to exist. And finally, David Deamer, biomolecular engineer at the University of California, Santa Cruz, wrote that, thanks to Venter's successful reassembly of a synthetic genome, we might soon be able to "answer one of the great remaining questions of biology: how did life begin?"

However ambitious they are, neither Venter nor his colleagues are especially given to hyperbole or delusions of grandeur. In their May 20 press release, the Venter Institute claimed no more than the "successful construction of the first self-replicating, synthetic bacterial cell." In their original research article, they acknowledge the natural origin of the recipient cell's cytoplasm but point out that JCVI-syn1.0's progeny act "as if the whole cell had been produced synthetically." Moreover, Venter admits in the paper's introduction that "our genomic knowledge remains very limited" and that "no single cellular system has all of its genes understood in terms of their biological roles."

No matter how one characterizes it, Venter's latest accomplishment developed out of a larger project that began in 1995. When he sequenced *M. genitalium*, the bacterium with the smallest genetic complement of any known organism capable of growth in the laboratory, his ultimate goal was to build a cell with the minimum genome needed to survive. At that time, Venter discovered that 100 of that species' 485 protein-coding genes were expendable when disrupted one at a time.

JCVI-syn1.0's genome is almost twice as voluminous as that of *M. genitalium*. But Venter plans to whittle away at its genetic complement as well, until he can exploit a minimal cell as a platform for distinguishing the function of every gene essential to its existence. The ultimate triumph, of course, will be to combine the technical successes of synthesis and transplantation with a profound knowledge of genetic utility into something genuinely magnificent. If, through these researchers' hard work and creative genius, we learn to control entire genomes from their very inception—to make them do our bidding—indeed, what can't we accomplish?

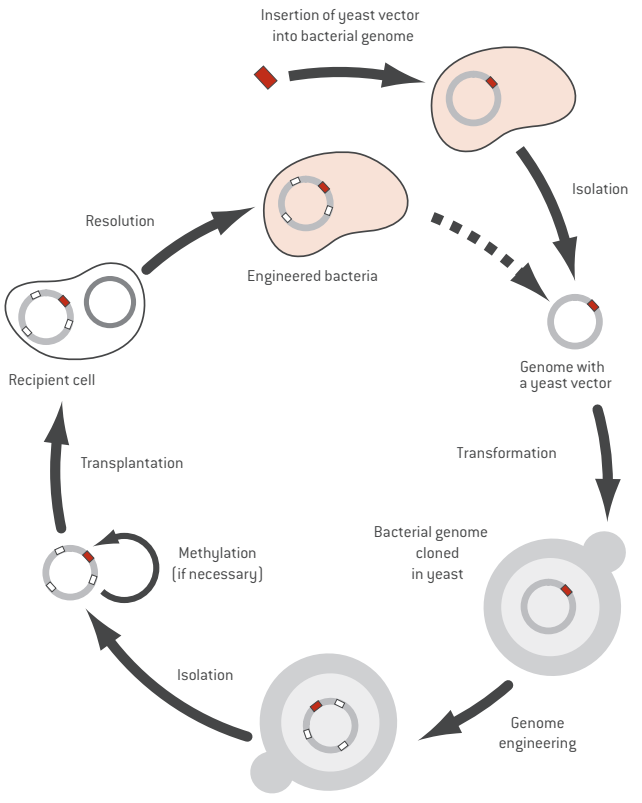
Which is precisely the heady question that has many lay people, politicians, and even some experts on edge. Also on May 20, Barack Obama penned a letter on the subject to Dr. Amy Gutmann, University of Pennsylvania president and now co-chair (along with Emory University President James Wagner) of the Presidential Commission for the Study of Bioethical Issues. Palpably concerned, Obama asked Gutmann to prepare a broad study of this "scientific milestone" within six months, focusing on "potential health, security or other risks" and "identifying appropriate ethical boundaries." Strangely, the president requested that the commission "consult with a range of constituencies," including "faith communities."

On May 27, the editors of *Nature* cautiously praised Obama's inquiry, calling it a "belated step in the right direction." Urging the swift establishment of an international framework of governance on synthetic biology, the editors warned that the construction and transplantation of whole genomes "may be routine within five years," and that universities, individual investigators, and governments are "almost certainly not attentive enough to security risks" posed by "do-it-yourself" biologists.

Others appear somewhat less distressed. Although troubled by the participation of nonprofessionals in this nascent "life sciences revolution," health

Creating Bacteria from Prokaryotic Genomes Engineered in Yeast

Credit: J. Craig Venter Institute



Credit: J. Craig Venter Institute

JCVI Synthetic Biology Team

experts Mildred Cho and David Relman de-emphasized the potential risks associated with JCVI-syn1.0. In the July 2 issue of *Science*, they argued that Venter's latest accomplishments "do not cause particular concern" in terms of biosecurity and that "few, if any, new ethical issues are raised." More vital for Cho and Relman is the scientific community's relationship with an already distrustful public. Now more than ever, they advised, synthetic biologists need to communicate their intentions, minimize conflicts of interest, and abstain from incendiary language referring to "programmed" or "artificial life."

Then, on July 8–9, thirteen prominent scientists gathered to testify as part of the president's bioethics commission in Washington, D.C. Some contended that, despite Venter's research, very little in biology has changed during the past fifty years in terms of security threats, and that existing regulations and oversights are sufficiently broad and brawny to handle the difference. Harvard geneticist Raju Kucherlapati, for instance, remarked that the same concerns were raised and addressed beginning thirty-five years ago in response to recombinant DNA technology.

Others, including Venter himself, argued that the rules of the game have indeed changed considerably because of the relative ease with which large chunks of DNA can now be constructed with a synthesizer from digital code. Now, they warned, the process is available even to students and amateurs. These witnesses called for further regulations requiring DNA synthesis businesses—including Blue Heron Biotechnology, for example, the company that filled the Venter Institute's order—to screen requests for the sequences of known pathogens that could be used as bioweapons. The presidential commission is scheduled to convene again in September and November of this year.

Venter and his colleagues were keenly aware of these concerns when they created JCVI-syn1.0. To make the cell's progeny retraceable to their owners and to distinguish them from their natural counterparts, the team inserted into JCVI-syn1.0's genome four "watermarks": the key to an alphanumeric code, a website address for those who have solved it, the names of the forty-six scientists who contributed to the project, and pithy quotes from James Joyce, Robert Oppenheimer, and Richard Feynman ("What I cannot build I cannot understand"). Venter also disabled the native genes rendering *M. mycoides* a bothersome bug that causes mastitis in goats.

But the project's breakthrough has triggered a dynamic discussion regarding future safeguards. Although cells with synthetic genomes are unlikely to survive outside the laboratory, they could be programmed with limited life spans or with on/off switches, as Bedau has suggested. Or perhaps they could be engineered with sequences that simply cannot exist in nature. Though an environmental group, Friends of the Earth, has asked the FDA and the EPA to "fully regulate all synthetic biology experiments and products," it may turn out that private entities—with government assistance, of course—are better equipped and motivated to oversee their experiments and control their outcomes.

So what about the potential benefits of JCVI-syn1.0? Venter admits that his cell is of no immediate practical use. Such latency is typical of great science, after all. But Venter remains tightly focused on the future, including possible applications he envisioned long ago. Already, he and SGI are collaborating with ExxonMobil—which is prepared to spend $600 million on the venture—to create a novel strain of algae capable of capturing carbon dioxide and using it to manufacture diesel fuel. Venter has also received funding from the NIH and is working with Novartis in the hope of quickly developing synthetically derived proteins for use in flu vaccines.

Such are only isolated examples, of course, in a brave new world of limitless potential. Combining chemistry, cell biology, genetics, and computer science, synthetic biology is no doubt as much a Pandora's box as it is a magician's hat. But let's hope that scientific curiosity and entrepreneurial passion drive the impending debate at least as forcefully as fear and, most certainly, envy. With inspired innovators like J. Craig Venter and his colleagues in the game—peering over the box's edge or past the hat's brim—we might finally learn to expect and, in appropriate cases, appreciate the unexpected.

[THE SCIENCE OF MEDICINE STEVEN NOVELLA

Steven Novella, MD, is assistant professor of neurology at Yale School of Medicine, the host of the *Skeptics' Guide to the Universe* podcast, author of the *NeuroLogica* blog, executive editor of the *Science-Based Medicine* blog, and president of the New England Skeptical Society.

The Poor, Misunderstood Placebo

A recent study looking into the effects of acupuncture on relieving back pain was widely reported in the media as finding that "acupuncture works, even fake acupuncture." Behind the headlines, the authors were more circumspect in the paper itself, concluding:

> Although acupuncture was found effective for chronic low back pain, tailoring needling sites to each patient and penetration of the skin appear to be unimportant in eliciting therapeutic benefits. These findings raise questions about acupuncture's purported mechanisms of action. It remains unclear whether acupuncture or our simulated method of acupuncture provide physiologically important stimulation or represent placebo or nonspecific effects. (Cherkin et al. 2009)

The authors compared acupuncture to placebo acupuncture (creating the sensation of acupuncture with toothpicks that do not penetrate the skin) and found no difference. When a drug is compared with a placebo and there is no difference in the response, the standard conclusion is that the drug has no effect—it does not work. But that logic is being turned on its head by what is being called "placebo medicine," in which the placebo effect is seen as a real, valuable, and desired outcome of patient treatment (Novella 2009).

Placebo effects (plural), however, are varied and complex. For the most part they are not a biological response to the expectation of benefit, which is what most people assume. Understanding placebo effects is critical to making sense of medical research and ever-expanding health claims within an increasingly unregulated market.

Operational Definition of Placebo

In the context of research, the "placebo effect" has a very specific operational definition: it is the treatment effect measured in the placebo arm of a clinical trial, which includes those subjects who have received a fake or inert treatment. If a trial is rigorously designed, placebo effects should include everything other than a physiological response to a biologically active treatment. Therefore, we can subtract placebo-effect findings from the treatment group, who will display treatment effects plus placebo effects, and we are left with a measurement of the treatment effect alone.

This simple but effective logic is the cornerstone of medical research. It is necessary because there are a variety of effects that can create the false impression that a treatment is working even when it isn't. It is a mistake to assume that the only relevant false impression is a "mind over matter" effect resulting from belief in the treatment. This is not the case.

Placebo Effects

Placebo effects fall into several categories: illusions of observation, bias, nonspecific effects, and physiological effects. Much of what is measured as a placebo effect is, in fact, simply an illusion of the process of observation. These *illusory effects* include regression to the mean, which is a statistical phenomenon that includes extreme symptoms becoming less extreme as a matter of course. For any variable symptom, periods of time when symptoms are at their worst are likely, by chance alone, to be followed by a return to more average symptoms.

Other artifacts include the *biases* of the researchers and the subjects. Researchers want their interventions to work and may therefore bias their assessments to be more positive. Subjects want to receive an effective treatment and to meet the *expectations* of the researcher. They want to justify their risk, expense (even if it's just time), and their decision to receive a treatment or enter a trial. *Conditioning*, in which one associates a treatment ritual with feeling better, is another related placebo effect.

There are also a number of *nonspecific effects*, such as the well-documented *observer effect* (also called the *Hawthorne effect*), in which the very fact of being observed in a clinical trial results in a change in behavior and reporting (McCarney et al. 2007). People are more likely to be compliant with treatment, take better care of themselves, and get regular medical attention as part of a trial. Related to this is the *cheerleader effect*: for any functional assessment, people will tend to try harder if they are being encouraged, if they feel they should be doing better, or if they have hope that the treatment is working.

And finally there are real *physiological effects* resulting from the ritual of treatment. For example, treatment may involve relaxation or simply taking a break from your otherwise hectic daily routine. Believing one is being treated may reduce anxiety about the illness or symptoms, which in turn may reduce

sympathetic activity, reduce blood pressure and strain on the heart, and reduce the levels of stress hormones. Hands-on treatments have the benefit of human contact, which improves mood and provides an overall feeling of well-being.

The perception of pain in particular is subject to these nonspecific effects, such as when an improved mood reduces the perception of pain. In addition, conditioning, expectation, and nonspecific benefits may actually cause the release of natural endorphins that reduce pain transmission (Benedetti 2007) or the release of dopamine in the reward centers of the brain (de la Fuente-Fernández and Stoessl 2004).

Breaking It Down

Given this more thorough understanding of placebo effects, it is not reasonable to assume that the measured placebo effect in a clinical trial is mostly or entirely a real "mind over matter" health benefit. Instead, the placebo effect may consist mostly or entirely of illusion and bias. One might ask, "Which kinds of effects are contributing to the measured placebo effect of specific treatments?" The answer is that it depends on what is being treated.

For example, a study of placebo effects in the treatment of irritable bowel syndrome (Kaptchuk et al. 2008) found a substantial placebo effect in place with the use of placebo acupuncture. The same study also found that the enhanced placebo group—members of which received placebo acupuncture with enhanced interaction between the therapist and the subject—reported added "warmth, attention, and confidence." After three weeks, the waiting-list group (those who received no treatment—not even placebo) had about a thirty-point drop on the symptom severity scale, with almost 30 percent of patients reporting adequate relief; the treatment group (those who received placebo acupuncture) had a forty-two-point drop, with 44 percent of patients reporting relief; the augmented group (those who received placebo acupuncture plus enhanced interaction with the therapist) reported a drop of over eighty points, with over 60 percent of patients reporting relief.

It's very interesting that the group that received no intervention, not even a placebo, still had a 30 percent response. This response is likely entirely due to observational artifacts (Hawthorne effect, etc.). The placebo intervention also led to an improved response—in this case, expectation and conditioning might be having an effect. The enhanced intervention group showed the strongest effect, likely representing an increase in the nonspecific benefits of a positive therapeutic relationship.

Hróbjartsson and Gøtzsche have been studying placebo effects for years. They recently reviewed clinical studies that contain a no-treatment arm as a way of measuring placebo effects. They conclude:

> We did not find that placebo interventions have important clinical effects in general. However, in certain settings placebo interventions can influence patient-reported outcomes, especially pain and nausea, though it is difficult to distinguish patient-reported effects of placebo from biased reporting. The effect on pain varied, even among trials with low risk of bias, from negligible to clinically important. Variations in the effect of placebo were partly explained by variations in how trials were conducted and how patients were informed. (Hróbjartsson and Gøtzsche 2010)

Let's break this down a bit. First, Hróbjartsson and Gøtzsche found that when you look at any objective or clinically important outcome—the kinds of things that would indicate a real biological effect—there is no discernible placebo effect. That is, there is no "mind over matter" self-healing that can be attributed to the placebo effect.

What the authors found is also most compatible with the hypothesis that placebo effects, as measured in clinical trials, are mostly due to bias. Specifically, significant placebo effects were found only for subjectively reported symptoms. Further, the size of this effect varied widely among trials.

Conclusion

Increasingly, placebo effects are being used to justify the use of ineffective and even inert treatments, with the assumption that "the" placebo effect is a true healing effect. What the research indicates, however, is that there are many placebo effects, and they are mostly bias and illusion—not real effects. There are also nonspecific effects that are likely valuable, but these effects can mostly be categorized as stress reduction and improvement in mood through attention and encouragement. It should be remembered that any placebo effect worth having will also accompany a legitimate treatment that actually works. On close inspection, placebo effects are not a justification for substituting hocus-pocus for real medicine.

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MONSTER MAYHEM

Monsters, both real and imagined, have fascinated mankind for millennia. From zombies and Frankenstein's monster to the golem and ghosts, abnormal creatures continue to fascinate and frighten us.

We hope you enjoy our roundup of monsters, as science sheds light behind the myths–and under the bed.

Frankenstein Was Not a Doctor

Misconceptions about the novel *Frankenstein, or the Modern Prometheus* arose from the errant and misleading interpretations of the story in film adaptations.

RON WATKINS

The concept many people have of *Frankenstein* is the story of a mad doctor who creates a monster from stolen, dead body parts but mistakenly endows it with a criminal brain. The resulting creature—called "Frankenstein"—is an uncontrollable, murdering fiend who eventually kills his own creator. Though widely recognized as the authentic telling of the classic horror tale, this concept, which stems from various film adaptations, is not the story written by Mary Shelley published in 1818. It is true that movies often differ from the books on which they are based, but critical misconceptions about Shelley's brilliant work that have become ingrained into the public consciousness over the years can be traced back to the movie versions of the story, beginning with Universal Pictures's *Frankenstein* in 1931. The movie has become more familiar to people than the original novel. It has a life of its own, apart from the book, and has little to do with Shelley's work itself, other than the title. In the novel there is no criminal brain; the creature does not kill his creator; and though he may have been mad, Frankenstein was not a doctor!

Most people probably realize that the name "Frankenstein" is properly applicable to the creator, Victor Frankenstein, and not his creation, which is often referred to as "the creature" in the novel *Frankenstein, or the Modern Prometheus.* Still, popular culture continues to identify the creation, or "the monster," as "Frankenstein." This corruption of the name can be directly attributed to the numerous motion pictures stemming from the extraordinary novel, in particular the eight made by Universal Pictures during the 1930s and '40s (beginning with 1931's *Frankenstein* and ending with 1948's *Abbott and Costello Meet Frankenstein*). The latter movie and some of the others—namely *The Bride of Frankenstein* (1935), *The Ghost of Frankenstein* (1942), and *Frankenstein Meets the Wolfman* (1942)—compound this confusion because their titles refer directly to the creature, not the creator.

Although Universal's *Frankenstein* and its sequel, *The Bride of Frankenstein*, are now considered classics, it is most likely in the original film that the misapplication of the name began. When the newly created and somewhat unsteady being first appeared on screen, his creator cautioned him, "Take care, Herr Frankenstein, take care!" This endearing scene is not found in the novel, in which the initial encounter between Frankenstein and his creation is quite different:

> I beheld the wretch—the miserable monster whom I had created. He held up the curtain of the bed; and his eyes, if eyes they may be called, were fixed on me. His jaws opened, and he muttered some inarticulate sounds, while a grin wrinkled his cheeks. He might have spoken, but I did not hear; one hand was stretched out, seemingly to detain me, but I escaped and rushed downstairs. (Shelley 1991, 43)

In addition to the misuse of Victor's last name, the Universal screenwriters took the curious step of reversing the first names of Victor Frankenstein and his friend Henry Clerval; Frankenstein becomes "Henry" and his friend is "Victor." There seems to be no motivation for, or benefit derived from, such an alteration. Shelley saw Victor Frankenstein as playing God and may have drawn his name from *Paradise Lost*, in which Milton refers to God as

"the Victor"; thus the filmmakers violated Shelley's original intention with this unwarranted editing.

Another misconception from the movies is the belief that the creature is inarticulate, though an attempt is made in *The Bride of Frankenstein* to follow the novel by giving him speech. Able to communicate, the creature forces Frankenstein to create a mate for him. Although this storyline is similar to what happens in the book, the results differ sharply. In the original story, Frankenstein destroys his work on a female being before completion, thus incurring the further wrath of the creature. In the movie, Frankenstein completes his work, but the creature experiences another rejection when his intended "bride" finds him repugnant and will have nothing to do with him.

In this same film, the creature learns language from a blind hermit with whom he shares some tender moments, learns to laugh, and even sheds some tears. These appealing scenes are not found in the novel, but they do resemble a meeting therein between the creature and a blind man named De Lacey who lives with his family in the woods. Unfortunately, while *The Bride of Frankenstein* makes an effort to develop the creature along lines similar to the novel, later film versions return him to the role of dumb, murderous brute.

On the contrary, Mary Shelley's creature becomes an articulate, educated being who learns to speak and read French. He knows the history of prior civilizations and is familiar with

"I beheld the wretch—the miserable monster whom I had created. He held up the curtain of the bed; and his eyes, if eyes they may be called, were fixed on me."

—Mary Shelley's *Frankenstein*

World History Archive/Newscom

The creature becomes capable not only of logical thought and speech but also of diabolical scheming.

great literature, such as Milton's *Paradise Lost*, in which he compares himself to the rejected Satan instead of the nurtured Adam. Frankenstein's creation achieves all this while hiding in a hovel next to the De Lacey family cottage, observing them for a year. At one point, while the rest of the family is away, he presents himself to the blind family patriarch in a passionate but naive appeal for friendship. He experiences initial success because his host cannot see his hideous appearance but hears only his inner suffering and need, a further indication of the creature's humble, not hostile, nature. Sadly however, the returning family, who see only the creature's outward ugliness, drive him away to continue his friendless wandering. His hatred toward his creator for abandoning him intensifies daily.

The creature becomes capable not only of logical thought and speech but also of diabolical scheming. He innocently approaches Victor's little brother William for solace but strangles him when the boy also rejects him. The creature then plants the boy's locket on Justine, Frankenstein's sleeping servant girl, in a successful attempt to have her accused of the crime and hanged. Such devious planning and forethought reveal a mind capable of complex reasoning. Thus the creature is, admittedly, quite a vengeful character in the book and does commit murder to cause suffering to Frankenstein and family. In his tormented mind, he feels justified for his crime; there is rationale and purpose to his horrific deeds, and he is not the ignorant automaton of the movies.

In the novel, Victor Frankenstein tells us through his journal that his time and effort during his stay in college were devoted to the study of the human frame and, in particular, the monumental question of just where life originated. In reading the novel, we too become curious and wonder just what secret Frankenstein discovered and by what process he applied it to his creation. Because we are so engrossed in the story that we half expect a valid answer, we find Frankenstein's rather casual revelation somewhat disappointing:

> After days and nights of incredible labor and fatigue, I succeeded in discovering the cause and generation of life; nay, more, I became myself capable of bestowing animation upon lifeless matter. (Shelley 1991, 37)

After this profound understatement, Frankenstein refuses to share the secret of life on the grounds that it will lead the reader to "destruction and infallible misery" and "mankind will be happier without it." Obviously Mary Shelley did not know the secret of restoring life to the dead. Hollywood answers the question of the life-giving process with an awesome and frightening display of lights and electricity amid showers of sparks and explosions produced by an array of electrical machines. The machines harness the lightning and feed it through the electrodes attached to the creature's neck, causing a quickening of muscles, activation, and life. The process described in the novel is not nearly as dramatic:

> I collected the instruments of life around me, that I might infuse some spark of being into the lifeless thing that lay at my feet. It was already one in the morning; the rain pattered dismally against the panes, and my candle was nearly burnt out, when, by the glimmer of the half-extinguished light, I saw the dull yellow eye of the creature open; it breathed hard, and a convulsive motion agitated its limbs. (Shelley 1991, 42)

Frankenstein's success seems to stem more from chemical or mechanical stimuli that result in a slow physiological transformation than from a sudden "shocking" into existence. Furthermore, the scientist's studies had always been devoted to natural philosophy, including fields such as chemistry and mathematics, not electricity—which would support a quieter, less spectacular event than what the movies give us. (Just what the "instruments of life" are, we're left to ponder.)

In her author's introduction to the novel, Shelley is a bit more specific when she describes her dream that inspired the frightful tale:

> I saw the pale student of unhallowed arts kneeling beside the thing he had put together. I saw the hideous phantasm of a Man stretched out, and then, on the working of some powerful engine, show signs of life and stir with an uneasy half-vital motion. (Shelley 1991, xxv)

Still, it is not clear exactly what transpired to quicken and give life to Frankenstein's assembly of dead tissue. "The working of some powerful engine" should not be equated with Hol-

lywood's shocking electrical display because the phrase was used in Shelley's time and earlier as a vague catch-all referring to any mysterious or seemingly magical device, procedure, or manifestation. (See, for example, chapter 2 of *Gulliver's Travels* by Jonathan Swift, in which Gulliver's watch, comb, and razor are called "powerful engines" by the Lilliputians.)

All the descriptions in the novel and the movies of Victor Frankenstein's obvious scientific knowledge and surgical skills lead us to assume that he must have been a doctor, and he is often referred to as such in films, television, and commentary. However, he is never referred to as such in the novel. Had Victor achieved such status, surely he would have been addressed as "Dr. Frankenstein" by Shelley. Although Frankenstein was educated in the schools of Geneva and attended the University of Ingolstadt, where he became quite successful with his studies and experiments, there is no evidence in the novel that the scientist ever graduated or received any kind of medical degree. In fact, the title character tells us that he had reached the point where he felt he could learn no more, and that his presence at Ingolstadt was no longer conducive to his improvements; thus, he considered returning home to Geneva, until his astounding discovery prompted him to delay his departure.

After his discovery, Frankenstein pushes his efforts to their eventual horrible success, but he is wracked with regret over what he has done and lapses into bouts of intense fear and fever—requiring medical attention and a return home. The rest of his life is consumed by determined but frustrating efforts to right his wrong and destroy his creation due to the death and sorrow it has inflicted upon his family. Shelley gives no account of Frankenstein returning to the university or receiving any medical award that would qualify him as a doctor.

For those who "grew up" with the *Frankenstein* films but have not read the novel, these movies are their first, and perhaps only, exposure to the story; people may be surprised to learn that they don't know the real version at all. Subsequent films and television shows have missed opportunities to correct this problem, and in fact they may have exacerbated it by claiming to be "the true story of Frankenstein." Kenneth Branagh's 1994 film interpretation is entitled *Mary Shelley's Frankenstein*, which implies that the movie is based directly on the novel. Though it is faithful to a point, there are many errant details, culminating in a silly sequence that has Victor revive his wife, Elizabeth (whom the creature has killed), only to have her die again in a fiery suicide. This drama is not taken from the book, in which Elizabeth dies just once, permanently.

Aside from plot details, there are also major thematic differences in the story between the novel and the film interpretations. The question of how far scientists should go in their quest for knowledge is a major theme of the novel but is only implied in the films. This is still an important and relevant question in this age of technological developments such as cloning. Secondly, the intense suffering resulting from the rejection and isolation of Frankenstein's creation—because he is different—forms a very important theme of the work, which Shelley clearly emphasizes but the movies fail to consider.

Richard Holmes, in his remarkable study, *The Age of Wonder* (2008), reveals that the corruption of Mary Shelley's novel began in stage plays soon after its publication. Holmes goes on to state that the changes in these plays have influenced almost all subsequent stage and film productions (p. 334). However, it is difficult to believe that these early stage productions, so far removed from the Universal films of the 1930s and '40s, could have had any direct influence on them, and it is not these stage plays with which most people identify when they contemplate *Frankenstein*. Although Holmes's work does reveal an early tendency to change Shelley's plot details, such as portraying the unfortunate creature as an inarticulate monster, these changes have been burned into the human psyche not by the stage plays but by the various movies with which most people are familiar.

Does it really matter that a work of fiction has been so misinterpreted? After all, the movies are fun to watch, the story they tell is an intriguing one, and a movie can't be expected to replicate a book in all aspects. While all this may be true, it does matter that the Hollywood versions of this story are lacking the novel's major themes and plot details. What we believe about this classic literary work is simply false, yet society has accepted it as true. It's as if the novel has been cast aside and forgotten, and that probably matters most of all.

Hollywood filmmakers have created such a vast gap between the novel and the films that what we have today is not just two types of media telling the same story, but two types of media telling completely different stories. They are both about a man who creates a man, but that is where similarities end. Other film adaptations, such as *Gone with the Wind*, have been much more successful in maintaining the integrity of the original work. Original books can often still be recognized in their associated films, but *Frankenstein* has been so overshadowed by film versions that the book is no longer relevant to most people. This is a shame because Shelley's *Frankenstein* is a great work of literature with multiple levels of meaning; however, contrary to popular belief, Shelley's story has never been told accurately on the screen. ■

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Ron Watkins, who has master's degrees in theology and education, taught high school English for fifteen years. His previous articles have appeared in *Writing Award*, *Discovery*, and *Reminisce* magazines and *English Journal*.

Zombie!
Joining the Living Dead

In studying the zombie in popular culture, the author even metamorphoses into one—perhaps as real as any.

JOE NICKELL

In popular culture, the zombie is a mindless, walking corpse. An element of the Haitian cult of vodun, or voodoo, *zonbi* is a word loaded with numerous meanings and implications. Technically, a *zonbi* is a portion of a human soul that is stolen and forced to work.

The common zombie is called *zonbi astral*, the spirit of a deceased person that is captured magically—by a *bokor* (or sorcerer)—and typically contained in a bottle; an empty rum bottle is often used. After a spirit is captured in it, the bottle is adorned with magical charms. The resulting fetish is thus alive with spirit and capable, voodoo practitioners believe, of working on the behalf of the person who possesses it—effecting healings, removing bad spirits, and performing other magical duties. An excellent introduction to this subject may be found in Elizabeth McAlister's 1995 book chapter, "A Sorcerer's Bottle: The Visual Art of Magic in Haiti."

Another type of *zonbi* is the rare living-dead entity in the form of a reanimated corpse. According to the authoritative *Funk and Wagnall's Standard Dictionary of Folklore, Mythology, and Legend* (1984), the sorcerer digs up the body after its interment, using it as he wishes. It is believed that if the zombi is allowed to eat food flavored with salt or, in some districts, if he is allowed to look upon the sea, he will return to his grave. It is held that, if necessary, a zombi can be turned into an animal, slaughtered, and the meat sold in the market, whence derives the belief among Haitian peasants that they have not only seen zombies but have bought their flesh. This, it is thought, can be distinguished by the fact that such meat will spoil much more readily than ordinary meat.

Popularized by Hollywood film studios, the zombie legend was boosted in 1932 by the movie *White Zombie*, starring Bela Lugosi. The zombie has since rivaled the vampire, the undead mummy (played by Boris Karloff), and Frankenstein's monster in celluloid popularity. According to Colin and Damon Wilson (1992, 413), "No one who has seen a film like *King of the Zombies* can ever forget the shot of a zombie marching on like a robot while someone fires bullet after bullet into its chest."

But what about stories telling of "real" zombies? They are difficult to investigate, not only because of their remoteness but because many anecdotal accounts are on par with Elvis Presley sightings, angelic visitations, or extraterrestrial encounters. Some investigators suggest that persons targeted as enemies may be "zombified" by the use of some "quick-acting poison" (Wilson and Wilson 1992, 413–17). Owen S. Rachleff, in *The Occult Conceit* (1971, 218), insists that "the cataleptic status achieved by some of the celebrants of voodoo sometimes becomes so severe as to be permanent." Still another theory, advanced by the director of Port-au-Prince's Psychiatric Center, holds that so-called zombies are merely drugged and enslaved

Makeup artist Rod Durick of Zombified Studios applies prosthetics to the author.

agricultural workers (*Reader's Digest* 1982, 113).

Wade Davis, an ethnobotanist, claimed in his 1985 book *The Serpent and the Rainbow: A Harvard Scientist's Astonishing Journey into the Secret Societies of Haitian Voodoo, Zombis, and Magic* that zombification could be caused by "zombie powder," which reportedly contains the poison tetrodotoxin (TTX). He presented the case of a man named Clairvius Narcisse who died and was buried on May 2, 1962. Eighteen years later, a man claiming to be Narcisse surfaced—rather literally, he claimed. This man convinced people, including a relative of Narcisse, that he had been drugged into a state of suspended animation. He said he could remember being buried and subsequently disinterred by a *bokor* and his helpers. The man claimed that he was enslaved on a plantation for two years but escaped with other zombies in an uprising. He supposedly spent the following years wandering about, looking for his family.

It is quite a tale, but it must be said that no serious scientific investigation was conducted into this claimant's story. The grave of Clairvius Narcisse was not opened to see if his body was missing, and of course DNA testing had not yet come to the fore (Hahn 2007). Psychologist Terence Hines, writing in the SKEPTICAL INQUIRER in 2008, observed that TTX produces symptoms markedly different from those observed in alleged zombies. Hines suggests that Davis's book "is an excellent example of a credulous foreigner taken advantage of by local tricksters and is full of scientific absurdities." Other alleged zombie stories have similarly been discredited.

The sorcerer digs up the body after its interment, using it as he wishes.

African American writer Zora Neale Hurston, in her book *Tell My Horse: Voodoo and Life in Haiti and Jamaica*, relates the case of a woman who appeared in ragged clothing in 1936, claiming to be a woman named Felicia Felix-Mentor who died in 1907. However, psychiatrist Louis P. Mars, reporting in the journal *Man: A Record of Anthropological Science* (1945), said of Hurston: "Evidently she got her information from the simple village folk, whose minds were conditioned to believing the real existence of a superhuman phenomenon. Miss Hurston herself, unfortunately, did not go beyond the mass hysteria to verify her information, nor in any way attempt to make a scientific explanation of the case." Dr. Mars, noting that the real Felicia Felix-Mentor had been lame due to a broken left leg, x-rayed both of the claimant's legs and found no evidence of any fracture. He diagnosed this "zombie" as schizophrenic.

From dusk to midnight I shuffled and lurched along the main street of "Metzburgh" in my zombie role.

At least two modern cases of alleged zombification were disproved by DNA testing. One claimant was diagnosed with brain damage resulting from anoxia; the other appeared to suffer from fetal alcohol syndrome (Hahn 2007). As with reports of other strange creatures, however, it is unlikely that most zombie tales will have a single, simple explanation. Least likely, of course, is a supernatural cause: the notion that zombies really are the "walking dead."

Nevertheless, on June 19, 2010, I became a zombie of the popular type—a "real" one in the carnival/circus sideshow sense of that word: with real makeup, real fake blood, and in a real phony trance state for the new horror movie *The Final Night and Day* (produced by DefTone Pictures Studios of Hamburg, New York, and slated for a March 2011 DVD release). Some 325 zombie extras and "hero" zombies (those with more elaborate makeup due to their proximity to the camera) participated, and I was in the latter group. My makeup was done by Rod Durick of Zombified Studios of Lackawanna, New York, who applied the silicone prosthetics, and his associate Tammy Janinum, who added color and blended everything to achieve a suitably horrific effect. Later I received liberal applications of "blood" on the set, and from dusk to midnight I shuffled and lurched along the main street of "Metzburgh" (Angola, New York) in my zombie role. My interpretation was less a Haitian-voodoo-style entity than a Hollywoodized ghoul that has taken on—so to speak—a life of its own. The irony is that this performance may have been as authentic as any other.

Zombie slaves embody the notion of induced mind/body control. The concept is pervasive, with paranormal entities typically possessing some means of monitoring mortals as a prelude to control. Examples range from mythological beings—like Cupid, whose magical arrows infect men's hearts with love, and Morpheus, who forms sleepers' dreams—to superstitious beliefs in angelic guidance,

demonic possession, voodoo hexes, and the like. Folklore includes abductions to fairyland from which people return with addled wits or sapped vitality. Popular literature brings examples such as Bram Stoker's *Dracula* (1897) and the mesmerizing Svengali in George du Maurier's *Trilby* (1894). Science fiction helped develop the alien-takeover concept with movies like *Invasion of the Body Snatchers* (1956). A 1967 *Star Trek* episode, "Errand of Mercy," features a "mindsifter," a device used by the alien Klingons to probe prisoners' thoughts during interrogations (Okuda and Okuda 1997, 141, 303; Nickell 2001, 204–5).

Acknowledgments

I am grateful to Tim Binga, Paul E. Loynes, Christopher Fix, and my wife, Diana Harris, for help with this article.

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The author, drizzled with "blood," appears on location for *The Final Night and Day*.

Ghost-Hunting Mistakes

Science and Pseudoscience in Ghost Investigations

There are thousands of amateur ghost hunters around the world whose techniques are modeled after hit cable television shows such as *Ghost Hunters*, which claim to use good science. But a close examination of typical ghost-hunting methods reveals them to be mostly pseudoscience.

BENJAMIN RADFORD

Millions of people are interested in ghosts. One 2005 Gallup poll found that 37 percent of Americans believe in haunted houses, and even more believe in ghosts. The "reality" TV show *Ghost Hunters* has been a huge hit for the Syfy channel, lasting six seasons so far and inspiring other shows. The show's ghost-hunting methods have been adopted by thousands of amateur ghost investigators across the country and around the world.

Just about every ghost-hunting group calls itself "skeptical" or "scientific." Many investigators believe they are being scientific if they use electromagnetic field (EMF) detectors or infrared cameras—or if they *don't* use psychics or dowsing rods. But the best way to know whether an investigator or group is scientific is to examine methods and results. Does the investigator use the pseudoscientific methods described here? What is the group's track record of solved cases? Does an investigation end with inconclusive and ambiguous results or a solved mystery?

Ghost investigations can be deceptively tricky endeavors. Very ordinary events can be—and indeed have been—mistaken for extraordinary ones, and the main challenge for any ghost investigator is separating the facts from a jumble of myths, mistakes, and misunderstandings. It can be very easy to accidentally create or misinterpret evidence: Is that flash of light on the wall a flashlight reflection—or a ghost? Are the faint sounds recorded in an empty house spirit voices—or a neighbor's radio? It's not always clear, and investigators must be careful to weed out the red herrings and focus on the verified information.

The most famous ghost hunters in the world, Jason Hawes and Grant Wilson (co-founders of The Atlantic Paranormal Society—T.A.P.S.—and stars of *Ghost Hunters*), agree that using science is the best way to approach investigations. They have always claimed to use good scientific methods and investigative procedures, for example writing that "T.A.P.S. uses scientific methods to determine whether or not someone's home might be haunted," and "We approach ghost hunting from a scientific point of view" (Hawes and Wilson 2007, 270).

Yet in their 2007 book *Ghost Hunting: True Stories of Unexplained Phenomena from The Atlantic Paranormal Society*, Hawes allots a grand total of *four paragraphs* (within 273 pages) to a chapter titled "The Scientific Approach." He doesn't have much to say about science or scientific methods, and in fact it's the shortest chapter in the book. Hawes is wrong in his belief that he and his T.A.P.S. crew are using good scientific investigative methods. After watching episodes of *Ghost Hunters* and other similar programs, it quickly becomes clear to anyone with a background in science that the methods used are both illogical and unscientific.[1]

Some of the T.A.P.S. crew's methods are slightly better than those of earlier groups (for example, Hawes and Wilson were among the first ghost hunters to dismiss the "orbs of light are ghosts" theory), but they are not much more scientific. The *Ghost Hunters* lacked good science to begin with, and their methods have not become any more scientific (or any more effective) since they began.

What follows is a short survey of the most common logical and methodological mistakes being made by the T.A.P.S. team and other groups that carry out ghost investigations.[2]

1. Assuming that no specialized knowledge or expertise is needed to effectively investigate ghosts.

One of the most common assumptions among ghost investigators is that in the paranormal field "there are no experts." If there are no experts, then of course anyone can effectively investigate ghosts. Almost all ghost hunters are amateur, part-time hobbyists, and they come from all walks of life. On *Ghost Hunters*, two ordinary guys who work as plumbers during the day are touted as experts on ghost investigations, although none of the team members has any background or training in science, investigation, forensics, or any other field that might help solve mysteries.

***Why it's a mistake*:** Paranormal investigation requires no certificate; anyone can do it with no training, knowledge, or expertise whatsoever. Whether they are *effective* or not—actually able to solve mysteries—is another matter entirely. *Effectively* investigating claims and solving mysteries *does* require some experience and expertise—specifically in investigation, logic, critical thinking, psychology, science, forensics, and other areas.

2. Failing to consider alternative explanations for anomalous or "unexplained" phenomena.

Ghost hunters often over-interpret evidence and fail to adequately consider alternative explanations, assuming for example that "orbs" are ghosts, EVPs (electronic voice phenomena) are ghost voices, and so on.

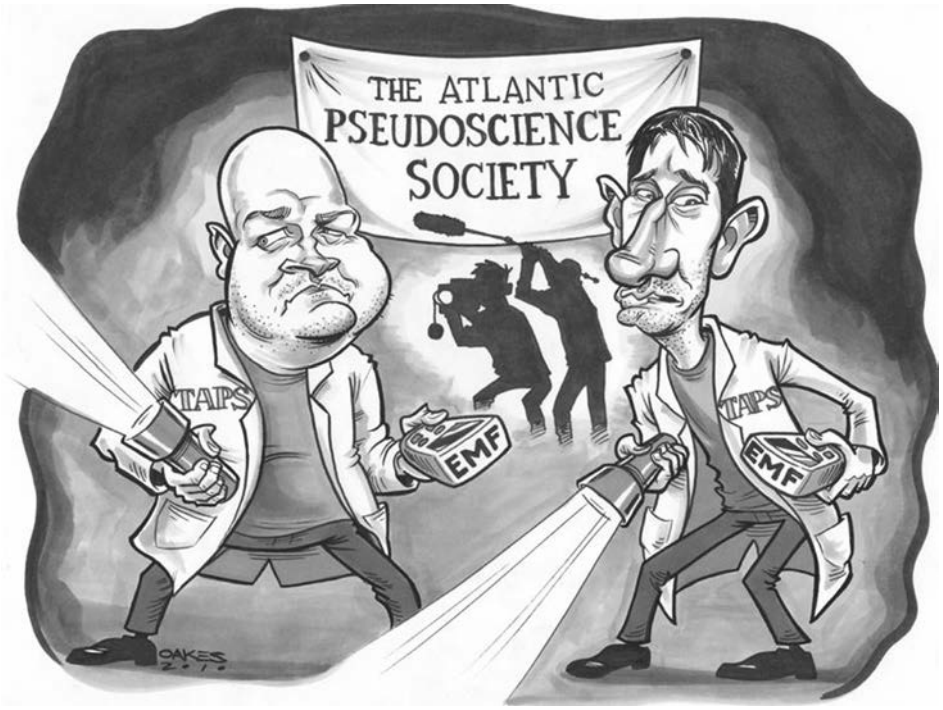
***Why it's a mistake*:** The designation of "unexplained" or paranormal must be accepted only when all other normal, natural explanations have been ruled out through careful analysis. The explanation that orbs are flash reflections of dust, insects, mist, etc., has been widely discussed for years (see Radford 2007, Nickell 1994). Many ghost hunters who accept the scientific, skeptical explanation for orbs continue to record EVPs as ghost voices despite the fact that scientific evidence of the validity of EVPs is as poor as it is for orbs.

Another common error is over-interpreting supposedly anomalous phenomena. Ghost reports are filled with phrases like "one investigator heard a young girl singing softly" or "the shadow of an old man appeared in the hallway." How, exactly, does the ghost hunter know for a fact it was a young girl's voice or an old man's shadow? I know adult women who can convincingly mimic the soft singing of a young girl or cast a shadow that might look exactly like an old man's. It is of course *possible* that the sound and shadow are of a young girl and an old man, respectively, but an investigator must be careful not to go beyond the established facts and assume that his interpretation is the correct one. After you have made a specific, declarative statement like "a young girl singing softly," you have locked yourself into that interpretation without keeping an open mind about other interpretations. Unless someone verifies the source of a sound, it is logically impossible to identify with any certainty who or what created that sound. An adult, an animal, a breeze whistling through an unseen passage, or something else altogether might sound like a child's voice. These types of reports are very common and cannot be accepted at face value.

3. Considering subjective feelings and emotions as evidence of ghostly encounters.

Ghost hunters often report descriptions of personal feelings and experiences like "I felt a heavy, sad presence and wanted to cry," or "I felt like something didn't want me there," and so on (see, for example, Avakian 2010). They may also describe in detail how they got goose bumps upon entering a room or grew panicked at some unseen presence, assuming they were reacting to a hidden ghost.

***Why it's a mistake*:** Subjective experiences are essentially stories and anecdotes. There's nothing wrong with personal experiences, but by themselves they are not proof or evidence of anything. Most people who report such experiences are sincere in their belief that a ghost caused their panic, but that belief does not necessarily make it true. The problem, of course, is that there is not necessarily any connection between a real danger or a ghostly presence and



how a person feels. The power of suggestion can be very strong, and a suggestible ghost hunter can easily convince herself—and others—that something weird is going on in a dark and creepy house.

4. Using improper and unscientific investigation methods.

Ghost hunters often misuse scientific equipment and ignore good scientific research methods. A few typical examples of this type of error follow.

Investigating with the lights off

Nearly every ghost-themed TV show has several scenes in which the investigators walk around in a darkened place, usually at night, looking for ghosts. Purposely conducting an investigation in the dark intentionally hobbles the investigation and is completely counterproductive. It also violates common sense and logic: If you are trying to identify an unknown object, is it better to look for it under bright lights or in a darkened room? There are no other objects or entities in the world that anyone would think are better observed in darkness instead of light; why would ghosts be any different? Humans are visual creatures, and our eyes need light to see—the more light, the better. Darkness, by definition, severely limits the amount of light and therefore the amount of visual information available. Searching at night in the dark puts investigators at an immediate and obvious disadvantage in trying to identify and understand what's going on around them.

Furthermore, this strategy fails on its own terms. Although some report seeing ghosts as glowing figures, many people report them as shadows or dark entities. Searching a dark room for a shadowy figure is an exercise in futility. Unless a ghost or entity has been specifically and repeatedly reported or photographed emitting light, there's no valid, logical reason for ghost investigators to work in the dark. The reason it's often done for television shows is obvious: it produces more dramatic footage. It's spookier and more visually interesting to film the ghost investigators with night-vision cameras.

Sampling errors

In my book *Scientific Paranormal Investigation*, I explain why a ghost stakeout or overnight investigation is a bad idea. But there's another, less obvious, basic scientific mistake made by many ghost hunters. Usually ghost hunters will begin their stakeout by taking readings with their high-tech equipment. Even though a thorough investigation into *specific claims* or phenomena (such as a door opening on its own or a strange noise) can be conducted in a matter of hours, a complete investigation into a haunted location can't be done in a few hours or even during an overnight stay. The reason is very simple: a few hours or overnight is not enough time in which to gather enough information. Establishing a valid set of baseline (or control) measurements for what "normal" (i.e., presumably ghost-free) conditions are at the location takes a lot more time.

To know what is extraordinary for the area, an investigator must first determine what is ordinary. Many ghost hunters understand this general principle but greatly underestimate the importance of valid sampling. For valid experiments, scientists must take dozens—sometimes hundreds—of independent measurements and analyze the results to derive a statistical average (along with a range of normal variation), which then can be used as a basis for research. The time frames and number of samples that most ghost hunters use are far too small to yield any scientifically meaningful baseline numbers.

Using unproven tools and equipment

Many ghost hunters consider themselves scientific if they use high-tech scientific equipment such as Geiger counters, EMF detectors, ion detectors, infrared cameras, sensitive microphones, and so on. Yet for any piece of equipment to be useful, it must have some proven connection to ghosts. For example, if ghosts were known to emit electromagnetic fields, then a device that measures such fields would be useful. If ghosts were known to cause temperature drops, then a sensitive thermometer would be useful. If ghosts were known to emit ions, then a device that measures such ions would be useful.

The problem is that there is no body of research showing that anything these devices measure has anything to do with ghosts. Until someone can reliably demonstrate that ghosts have certain measurable characteristics, devices that measure those characteristics are irrelevant.

Ineffectively using recording devices

EMF detectors, ion counters, and other gear have no use in ghost investigations. Ordinary cameras and audio recorders, however, can be helpful if used correctly. Unfortunately, many ghost hunters don't know how to use such equipment effectively.

One common example is the use of voice recorders. Most ghost hunters, including the T.A.P.S. team, use handheld voice recorders in an attempt to capture a ghost voice or EVP. Often the ghost hunter addresses the supposed spirit while holding the recorder and either standing in the middle of a room or walking around. Sometimes a voice-like sound or noise will be heard at the time; if so, the ghost hunter(s) will ask more questions, or the sound or EVP will be saved for later analysis.

Unfortunately, this is an ineffective protocol. To identify the nature of the sound (human, ghost, cat, furnace, etc.), an investigator must first determine its source, which in turn involves locating the sound's origin; this can be very difficult for a ghost hunter to do, especially in a darkened room. If the sound came from an open window, that suggests one explanation. If the sound's origin can be traced to the middle of an empty room, that might be more mysterious. Locating the source of a sound is nearly impossible using only one recording device.

A better way to scientifically determine the source location of a sound is with more than one microphone—at least three, and the more there are the better. By placing sensitive microphones throughout the location (and certainly in the four corners of a room),

the signal strength of the sound can be measured at each microphone. Along with a basic knowledge of acoustics and math, these readings allow the investigator to triangulate within a few feet where the sound came from. Ideally this work should be done in real time so that ghost hunters can immediately investigate the cause; finding some "anomaly" while reviewing evidence days or weeks later is pointless.

5. Focusing on the history of a haunted location instead of the specific phenomena reported at it.

Ghost hunters often spend considerable time and effort researching the history of a house or building by scouring local records and newspapers to determine when the place was built, who built it, and who may have lived or died there or by looking for stories, legends, tragedies, lists of past owners, and so on. This is a staple of *Ghost Hunters* investigations, which often begin with the T.A.P.S. crew and the TV audience listening to (real or fictional) stories about the history of the place.

Why it's a mistake: Although a supposedly haunted location might have a fascinating history, this almost always has little or nothing to do with the current haunting claims or phenomena. If a ghostly figure is reported in a stairwell, a spooky face is photographed in a bedroom, or a mysterious noise is reported coming from the attic, knowing who built the place in 1928 (or the name of the little girl who died in a fire there fifty years ago) is completely irrelevant. It has nothing to do with the face or noises, which must be investigated completely independently of this information. Sometimes ghost hunters will hear or record what they believe is the sound of a voice and assume it must be a ghost, then get so wrapped up in researching the house's history trying to "identify" the ghost that they neglect to fully investigate the source of the sound.

6. Conducting a stakeout or "lockdown."

A stakeout is typically an overnight "investigation" into a haunted location, usually with a half dozen or more people wandering around the premises, setting up cameras, taking readings, and so forth. All ghost-themed TV shows feature this activity, which is standard procedure for most ghost-hunting groups. It's also a sure sign of pseudoscience and amateur investigation.

Why it's a mistake: As an investigative *modus operandi* in ghost hunting, the stakeout (or "lockdown," as it's sometimes melodramatically called) has a 100 percent track record of failure; of the hundreds of stakeouts conducted by ghost hunters, not a single one has yielded any significant evidence of ghosts. (As I previously noted, they might have better success if they left the lights on.) A stakeout is essentially a scientific experiment without the science. Real experiments are carefully controlled by the investigator: he or she controls some variables or conditions and measures the variation. Ghost hunters seem to think that by controlling access to the property in question, they are reducing or eliminating any false evidence of ghosts.

However, in a stakeout the ghost hunter cannot control all, or even most, of the variables and conditions in the experiment he's conducting. It's important to remember that nearly anything that anyone thinks is odd for any reason can be offered as evidence of a ghost. There is an impossibly broad spectrum of phenomena that have been claimed as signs of ghosts, including lights, shadows, noises, silence, heat, cold, moving objects, smells, uneasiness, and so on. If the presence of a ghost could be narrowed down to a specific phenomenon—for example, if everyone agreed (or it had been somehow proven) that ghosts give off red light or a certain high-pitched sound—then the problem of not having a controlled location would be greatly reduced. An investigator wouldn't need to rule out every possible source of sound, smell, light, etc., but instead would need to rule out merely any sources of red light or high-pitched sounds. But because just about any phenomenon can be attributed to ghosts, there is no way to rule out or control for the conditions. A ghost stakeout or lockdown is a completely unscientific waste of time.

Ultimately, of course, whether ghost hunters choose to use scientific methods and strategies is up to them. I personally don't care either way; it's not my time, effort, and money that's being wasted by doing fundamentally flawed investigation. But over the years I have gotten results and solved many cases using scientific techniques.

If ghost hunters don't care about performing scientifically valid investigations and are happy with the level of evidence they are getting, they are welcome to ignore this information. But they can't complain that no one offered a science-based paradigm for paranormal investigation. I believe that if ghosts exist, they are important and deserve to be taken seriously. Most of the efforts to investigate ghosts so far have been badly flawed and unscientific—and, not surprisingly, fruitless. If investigation is to be done, it should be done right.

Notes

1. Ironically, Hawes and Wilson formed T.A.P.S. because they were dissatisfied with the lack of good investigation methods they saw among ghost hunters. According to Jason Hawes, "Finally I said, 'Screw the rest of what's out there,' referring to other ghost hunters and their methods. 'Let's do it our own way'" (Hawes and Wilson 2007, 5).

2. There are far too many mistakes in the typical ghost investigation to discuss them in any depth here. A fuller discussion can be found in chapter 4 of my new book, *Scientific Paranormal Investigation*.

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A longer version of this article is available as a free downloadable PDF at:
www.csicop.org/SIExtras

From the Edge of Postcards
The Wem Ghost Photo

Following a fire in a small English town, a mysterious photo of the blaze—seemingly depicting a girl ghost—circulated around the world.

BLAKE SMITH

On November 19, 1995, the town hall of the English market town of Wem burned, leaving only a charred brick shell. Among the locals watching the building burn was Tony O'Rahilly, who brought his camera and took several photos of the blaze. A few months later, in March 1996, O'Rahilly developed the photos of the fire in a little film studio he'd constructed in a shed in the garden behind his home. The series of pictures showed dramatic images of fire, light, and darkness. But one showed something even more astonishing—a ghostly girl standing amid the flames (Topham, n.d.).

O'Rahilly sent the photos to the Association for the Scientific Study of Anomalous Phenomena (ASSAP) for analysis. The ASSAP, which specializes in paranormal investigations, assisted O'Rahilly by having Vernon Harrison, former head of the Royal Photographic Society, examine the photos. Harrison concluded, "The negative is a straightforward piece of black-and-white work and shows no sign of having been tampered with" (Laursen 2007).

The ASSAP's conclusion was that the photo (see figure 1) showed a simulacrum (a random, ambiguous image interpreted as meaningful) caused by falling debris filmed during the fire. It did not appear to be a hoax. However, this conclusion was called into question by the British Broadcasting Company (BBC), which investigated the case for its television show *Out of this World*, hosted by current Independent Television (ITV) presenter Chris Choi.

In the BBC show, Choi interviewed O'Rahilly in his garden and also toured the burned-out remnants of the town hall. The conventional story of the ghostly photo was also told. But when the BBC took the photo to the National Museum of Photography, Film, and Television (now known as the National Media Museum), viewers learned a different story. Both of the photography

Figure 1. Tony O'Rahilly's hoaxed photo created by combining actual images from the town hall fire with an old postcard. (Courtesy of The Fortean Picture Library)

experts there, Paul Thompson and Will Stapp, agreed that the photo showed signs of manipulation and double exposure. Thompson in particular noted that he saw horizontal scan lines, as though the image consisted of a photo of a face on a video screen pasted into the picture of the fire. With that damning revelation, Choi returned to confront O'Rahilly, who responded, "No way . . . It's none of my doing."

I first became interested in investigating this case in September 2009. At that time, the allegations of the *Out of this World* show were not widely available on the Internet. As is usual in the echo chamber of ghost literature, the ghost stories rang loud and clear while the facts lay quietly subdued out in the back shed. I came across the BBC piece online and found it very interesting. A check of the ASSAP's website showed that they still felt the case was one of pareidolia instead of hoaxing. I found that intriguing and asked them why; they replied that the photo they'd provided to the BBC during the television investigation had been a duplicate, and in their opinion the "scan lines" observed by Paul Thompson had been the result of duplication, not hoaxing.

Trying to find a more pristine copy of the photograph to examine, I reached out to Janet Bord at the Fortean Picture Library. She was able to provide me with a high-resolution photo as well as a shot of the negative strip from which it was produced. As the ASSAP had said, the original did not have any scan lines. It showed a ghostly girl in the fire, but there was no evidence of digital scan lines.

Figure 2. This 1922 postcard, reprinted in the *Shropshire Star,* helped prove O'Rahilly's hoax.

I tried to contact Paul Thompson and Will Stapp. Both are still involved in photography but are no longer working with the National Media Museum. Neither Thompson nor Stapp responded

In the years since the fire, Wem has come to embrace the ghost.... People have reported seeing the ghost of Jane in the intervening years, usually carrying a candle.

Figure 3. This unnamed girl from the 1922 Wem postcard was used by O'Rahilly to create the ghostly image.

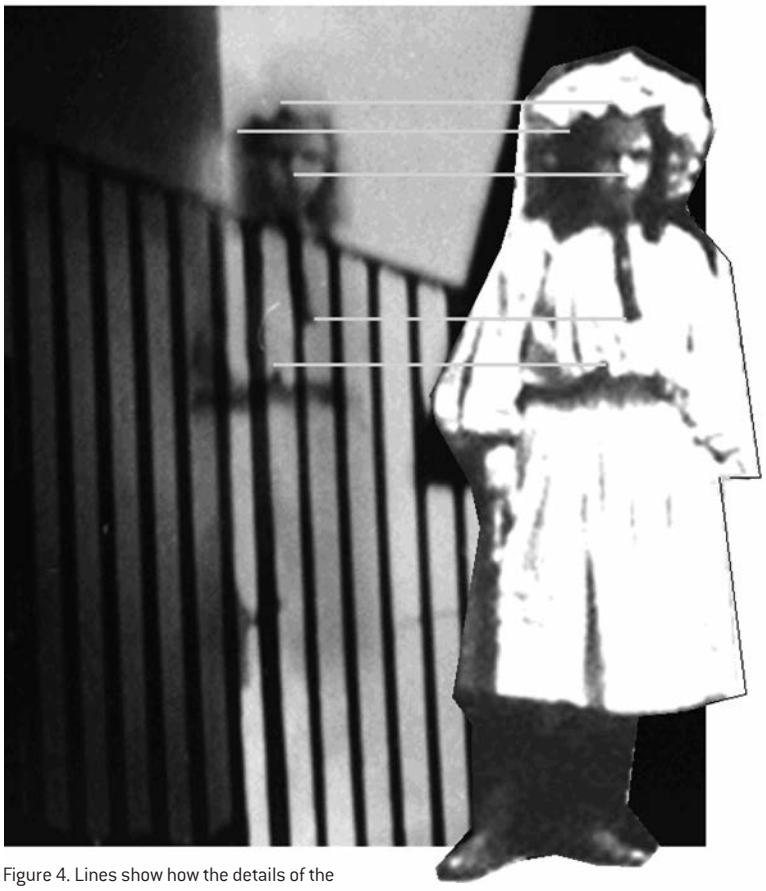

Figure 4. Lines show how the details of the "ghost" image line up with those of the postcard girl.

to my inquires, and other photography experts I approached were unwilling to opine on the matter.

To be clear, I didn't think the photo showed a ghost—but I was deeply curious to know whether O'Rahilly had photographed a piece of debris with an uncanny resemblance to a girl or had deliberately faked the photograph. I would have liked to have asked him, but he passed away in 2005.

And then the answer arrived in the morning mail. On Monday, May 17, 2010, the *Shropshire Star*, the local paper serving Wem, ran a story titled, "Does Postcard Solve Ghost Riddle?" The *Star* had run a photo a few weeks earlier showing a postcard from 1922 of a street in Wem (see figure 2). An alert reader named Brian Lear, a seventy-seven-year-old grandfather, noticed that the girl pictured in the postcard (see figure 3) bore a strong resemblance to the famous ghost girl and alerted the *Star*. In the May 17 article, the newspaper showed details from O'Rahilly's photo and the postcard and agreed with Lear that the resemblance was "striking" (Neal 2010).

Striking may be an understatement. Rarely does such a clear explanation for a ghost photo come to light. Rather than simply show both photos, I have created an animation demonstrating that the two girls are indeed the same photographic image: the one superimposed on the fire photograph by O'Rahilly via a double exposure. On the blog of *The Atlanta Skeptics*, my animated image of the girl on the postcard dynamically fades in over the ghost photo; the alignments should also be apparent from the still image shown in figure 4. The points of the girl's hat, the eyes, the nose, the neckline, and the beltline align perfectly between the two photos. O'Rahilly used this postcard image to make his ghost photo. Details missing from the ghost photo—but appearing in the postcard—are due to either the photographic process used to make the fake image or to O'Rahilly cropping the postcard prior to shooting his double exposure.

In the years since the fire, Wem has come to embrace the ghost. The town's history tells of a devastating fire back in 1677, allegedly caused by a girl named Jane Churm. People have reported seeing the ghost of Jane in the intervening years, usually carrying a candle (Karl 2007). It is no surprise that many have claimed that the girl in the photo must be Jane. After all, what's a ghost photo without a backstory? Even the spot where the ghost was "photographed" had been adorned with documentation of the paranormal event. Perhaps Wem's townsfolk should move that bit of documentation over to the late O'Rahilly's shed?

It's a pity that O'Rahilly died before this postcard came to light. He got plenty of media coverage when the photo was released originally, and now with the coverage of the explanation he could have enjoyed a second wave of interest. Indeed, he would have gotten double the exposure.

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Passion for the Paranormal

The Supernatural in Romance Fiction

Romance novels have enchanted readers for years. A relatively new subgenre of these novels, incorporating paranormal themes, has become increasingly popular.

TONYA KEYSER

"He reached for her, cupping one big, capable hand along her jaw and holding her there as he leaned in and touched his lips to hers.... The contact brought sparks of light and heat, a sizzle of connection and a sense of oh, yes *that rippled through her in waves, reverberating and overlapping, heightening as she murmured her pleasure and moved closer.... Michael glanced back at her, expression resolute as he said very quietly, 'I'm going to cast a shield. Cross your fingers that they don't have a magic-sniffer with them.'"* (Andersen 2009).

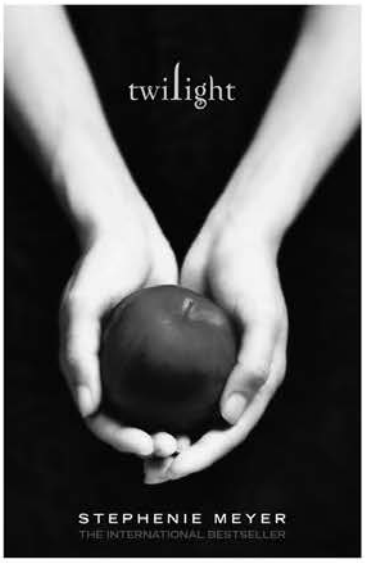
Skykeepers, a novel by Jessica Andersen, is one of countless recent offerings incorporating supernatural themes and characters into romantic fiction. The evolution of the widely read romance genre to include these ideas has spawned a relatively new—and increasingly popular and profitable—subgenre of fiction: the paranormal romance.

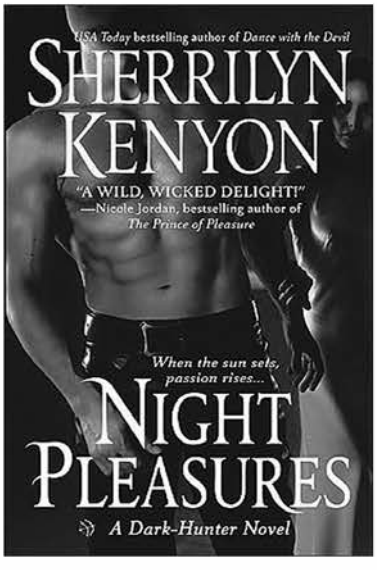
According to the Romance Writers of America (2010), one of the two elements a romance should contain is a central love story with a conclusion that provides emotional satisfaction to the reader (often referred to as the "happily ever after" ending). In spite of a decrease in book sales in general, romance novels have remained popular. This genre of fiction was the top-performing category on *The New York Times*, *USA Today*, and *Publishers Weekly* bestseller lists in 2008, according to the ROMStat Report (Romance Writers of America 2009), which reported that one out of four Americans had read at least one of these novels that year.

While romance novels are especially popular, fiction incorporating supernatural elements is also profitable. According to the January 15, 2010, issue of *USA Today*, paranormal fiction (which includes the paranormal romance subgenre) featuring vampires and/or other undead creatures accounted for at least 17 percent of all book sales tracked in 2009 (DeBarros et al. 2010). This impressive percentage showed an increase of fifteen points in just two years, with reports from 2007 at only 2 percent. The article further reports that Charlaine Harris, author of the Sookie Stackhouse novels (the series featuring a telepathic waitress who falls in love with a vampire, upon which HBO's hit series *True Blood* is based), had nine of her books in the top 100 sellers of the year. In the first quarter of 2009, Stephenie Meyer, author of the *Twilight* series, dominated *USA Today*'s Best-Selling Books list, with four titles in the top twenty (DeBarros et al. 2009). While those are familiar names to many, additional authors, such as Sherrilyn Kenyon, author of the *Dark-Hunter* series, are also remarkably popular. Kenyon had six number-one rankings on the *New York Times* bestseller list in just over twelve months; a 2008 convention scheduled in her honor was sold out in less than three minutes (Bond 2009).

Books with a supernatural emphasis accounted for $1.37 billion in sales in 2008 (Romance Writers of America 2009). Given these numbers, it is not at all surprising to discover that publishers are eager to entertain submissions of this type. According to Kensington editor-in-chief John Scognamiglio, "Paranormal romance remains red hot and shows no signs of stopping. Anything paranormal is immediately moved to the top of the submission pile" (Bond 2009).

In recent years, fanged immortal protagonists, lycanthropic lovers, and fanciful faeries have become a welcome




USA Today bestselling author of Dance with the Devil
SHERRILYN KENYON
"A WILD, WICKED DELIGHT!"
—Nicole Jordan, bestselling author of The Prince of Pleasure
When the sun sets, passion rises...
NIGHT PLEASURES
A Dark-Hunter Novel

addition to the bodice-ripping heroines and shirtless, sword-wielding pirates that have traditionally served as the mainstay of romance novel covers. "What's going on in the world now has an impact. With wars and the economy, romance is fantasy—these books are the ultimate escape," says Erika Tsang from Avon. Also, "Readers are always looking for something new" (Bond 2009). Paranormal romances often include the timeless "Beauty and the Beast" formula, invoking the relationship of a heroine falling in love with someone that is, on the surface, so very different and otherworldly but to whom she (and the reader) can relate. After all, romance novels are driven by characters that "must come to understand themselves and their relationship with each other" (Saricks 2009). How better to add to that conflict than by making one or more of the characters a supernatural being? The reader is led on a journey intertwined with the unexpected and foreign, which allows for an escape from reality while still embracing the comfortable and familiar characteristics of the more conventional romance novel.

While vampires are currently running rampant among the pages of these tales, other supernatural superstars are also emerging. Werewolves, time travelers, shape shifters, ghosts, and even angels are making their way into the imaginations of fans of the genre. Even the iconic and highly popular vampire has transformed over the years from the evil bloodthirsty murderer to the seductive, heroic lover. Individual paranormal romance novels do not confine themselves to only one type of character, either. Consider author Gena Showalter's description of hero Aden Stone from *Unraveled*:

> One of his best friends is a werewolf, his girlfriend is a vampire princess who hungers for his blood, and he's supposed to be crowned Vampire King—while still a human! With four . . . human souls living inside his head, Aden has alway been "different" himself. These souls can time-travel, raise the dead, possess another's mind and, his least favorite these days, tell the future. . . . But he isn't about to lie down and accept his destiny without a fight. Not when his new friends have his back, not when Victoria has risked her own future to be with him, and not when he has a reason to live for the first time in his life. (Showalter 2010)

Fanged immortal protagonists, lycanthropic lovers, and fanciful faeries have become a welcome addition to the bodice-ripping heroines and shirtless, sword-wielding pirates that have traditionally served as the mainstay of romance novel covers.

Readers of paranormal romance novels find the prospect of love with an otherworldly being, which is outside of the scope of their experience, appealing. "The setting is often gritty, and the characters tragic, powerful, and dangerous. At the same time, they possess human traits and emotions, and I can easily relate to them," says one habitual reader of vampire romances (Keyser 2010). The heroine in Sherrilyn Kenyon's popular *Night Pleasures*, Amanda Devereaux, describes the novel's hero, Kyrian, as follows: "There was something very unsettling and strange about this new Dark-Hunter. He was stillness, she realized. Like some bottomless pond. There was a calm serenity to him that was both beguiling and frightening" (Kenyon 2002). The power of a compelling story cannot be ignored. Another reader states, "I'm addicted to the stories. Once I read one book in a series, I can't stop until I've read them all. I can get completely lost in the books because they allow me to escape and immerse myself in something mystical. I've always enjoyed paranormal novels, such as the Harry Potter books, and this allows me to enjoy the same kind of characters in grown-up situations" (Keyser 2010).

Although many may consider romance novels in general to be nothing more than superficial flights of fancy, Pamela Regis, author of *A Natural History of the Romance Novel*, disagrees. She states that romance "contains serious ideas. The genre is not about woman's bondage, as the literary critics would have it. The romance novel is, to the contrary, about women's freedom. The genre is popular because it conveys the pain, uplift, and joy that freedom brings" (Guran 2006). Adding supernatural elements to the romance novel provides the author with opportunities to explore these ideas in new ways. "The idea that I, as a woman, have the choice to love someone that may not meet the approval of society is an appealing one. The ideal romance, in my opinion, is one that is taboo and somehow forbidden. We all want what we can't have, after all," states one fan (Keyser 2010). She adds, "The idea that someone with strength needs saving and can be saved through the power of love is one that keeps me reading these stories." Kyrian, Sherrilyn Kenyon's hero in *Night Pleasures*, is a Dark-Hunter, responsible for protecting the innocent from the horrible fate of having their souls stolen. He confesses his tragic and lonely existence by saying, "I find myself wondering if there's any way a woman can love a man whose battle scars run deep, and whose heart was damaged by a betrayal so savage that he's not sure it will ever beat again" (Kenyon 2002).

One of the reasons for the success of paranormal romance novels lies in the rise of supernatural topics in popular culture. It would be difficult to scan the cable television listings or films at the local theater without encountering some sort of reference to vampires, werewolves, psychics, ghosts, or some other mythical being. Chris Keesler, senior editor at Dorchester, remarks, "'How many people of the last few generations haven't seen *Buffy* [*the Vampire Slayer*] or one of its spinoffs? Above all, I think every genre is driven and perpetuated by the talent of its most successful authors, authors who cater to the public, to their day and age's literary zeitgeist" (Bond 2009). One cannot ignore the likely influence of hit television shows such as HBO's *True Blood* or the teen-focused *Twilight* movies in the surge in popularity of this subgenre.

Strategic marketing has played a role as well. One book publisher, Penguin, has even launched an online video network that features a channel entirely devoted to supernatural topics, such as werewolves and vampires. The purpose of this network is to give more exposure to books that use these elements in their stories (Milliot 2009). Paranormal romance novels are often shelved in bookstores in the fantasy or science-fiction sections. This provides the opportunity to gain readership from fans of other types of books, who might not venture into the stigmatized romance section. In addition, authors often cross genres or subgenres, sometimes using a pseudonym. Fans are likely to continue to read their offerings even when they cross these boundaries.

Paranormal themes are highly visible in today's entertainment offerings, and the romance novel, popular in its own right, is no exception. In spite of a downturn in general book sales, romance novels and paranormal-themed books are hot sellers. The marriage of the two is a real-life "happily ever after" tale for authors, publishers, retailers, and readers—at least for now. ■

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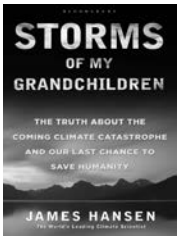
The Storms over Climate Change

DAVID MORRISON

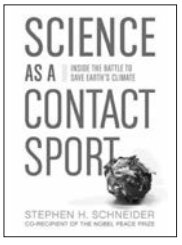
Anthropogenic (human-caused) global warming has become an emotional issue rife with political overtones. There is no dispute among climate scientists about the reality of global warming and the fact that it is primarily caused by accelerated burning of fossil fuels. However, there are nontechnical aspects of global warming that should interest readers of the SKEPTICAL INQUIRER: Specifically, how scientific evidence should be assessed in such a complex situation—and the way this evidence has been distorted and denied by a handful of scientists who are savvy about the politics of Washington and the media. As skeptics, we need to recognize the techniques used to distort and politicize the science. And as citizens, we should learn to recognize the similarities between these attacks on climate science and those used by creationists to undercut the fundamentals of biological science.

The three books I review here offer complementary frontline accounts of the Climate Wars. Both Jim Hansen and the late Steve Schneider have made important contributions to the development of climate science. Both started as modelers of the global atmosphere and ocean systems. Schneider led the climate team at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado, and Hansen worked at (and now directs) the NASA Goddard Institute for Space Studies (GISS), located at Columbia University in New York City.

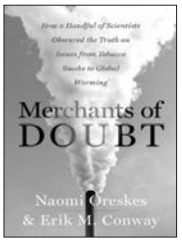
Schneider and Hansen, both members of the National Academy of Sciences (NAS), rose to prominence partly through their ability to explain complex climate issues to the press, to congressional committees, and ultimately to all of us. These two books of theirs are first-person accounts, geared toward the lay reader, that give about equal space to the scientific issues and to their own sometimes-controversial roles in them. The third book, *Merchants of Doubt* by Naomi Oreskes and Erik Conway, brings historical perspective to this issue. Oreskes and Conway compare the global-warming controversy to earlier campaigns to undercut the science that linked tobacco smoke to cancer, acid rain to smokestack emissions, and ozone depletion to the release of CFCs. This antiscience propaganda is a topic I will return to later in this review.



Storms of My Grandchildren: The Truth about the Coming Climate Catastrophe and Our Last Chance to Save Humanity
By James Hansen. Bloomsbury Press, New York, 2009. ISBN: 978-160819-200-7. 301 pp. Hardcover, $25.



Science as a Contact Sport: Inside the Battle to Save Earth's Climate
By Stephen H. Schneider. National Geographic Society, Washington, DC, 2009. ISBN: 978-1-4262-0540-8. 295 pp. Hardcover, $28.



Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming
By Naomi Oreskes and Erik M. Conway. Bloomsbury Press, New York, 2010. ISBN: 978-1-59691-610-4. 355 pp. Hardcover, $27.

* * *

Jim Hansen is perhaps the most famous (or notorious, depending on your politics) climate scientist. This is ironic given Hansen's midwestern roots, his careful approach to science, and his conservative, shy personality. Although he began his career as a planetary scientist studying the atmosphere of Venus, he has been working since the 1970s on understanding Earth's climate, primarily as leader of a small group of climate modelers who use NASA's powerful computers to simulate the processes that influence atmosphere and climate. As his conviction that the Earth is in

deadly peril due to the discharge of carbon dioxide into the atmosphere has grown, he has become an activist, first within the government as an advisor to the executive and legislative branches and more recently as an outspoken critic of "business as usual" practice and policies. *Storms of My Grandchildren* is his first book.

Hansen came to prominence in the hot summer of 1988, when he testified at a hearing before the Senate's Energy and Natural Resources Committee. He said that "Global warming is now large enough that we can ascribe with a high degree of confidence a cause-and-effect relationship to the greenhouse effect." The next day the *New York Times* declared: "global warming is here." There had been a growing consensus among climate scientists that greenhouse warming would take place, but Hansen was the first to state bluntly that it was already happening. People listened. By the end of the year, thirty-two climate-related bills had been introduced in Congress (none passed).

Hansen's book describes his adventures in the public spotlight, including interactions with Vice President Dick Cheney and President George W. Bush's Climate Task Force. We also hear about Hansen's experience in 1989 when he revealed, at a Senate hearing chaired by Al Gore, that the White House had altered his written testimony. In 2005 he again became the center of a controversy over censorship, as political appointees at NASA Headquarters tried to control even the basic temperature data that were being posted on the GISS website. When Andy Revkin of the *New York Times* exposed this heavy-handed attempt at political interference, the NASA Public Affairs officers backtracked and blamed the "misunderstanding" on a twenty-four-year-old intern who had faked his college degree and boasted that his job at NASA was "to make the President look good."

Above all, Jim Hansen is a hard-working scientist. Much of his book concerns his research on the science behind global warming as published in peer-reviewed academic journals. Hansen explains the fundamentals of climate change in a way that is accessible to the nonscientist. He does not overwhelm us with the mathematics of the greenhouse effect or the results of complex computer models of atmospheric circulation. Instead, he appeals to the more basic idea of conservation of energy, using data about climate changes over the past several million years to derive fundamental truths about our current dilemma.

The climate system reacts to changes imposed upon it, which is called *forcing*. These changes include variations in the amount of energy received from the Sun, slow changes in the orbit and tilt of the Earth, and of course changes in the composition of the atmosphere and its clouds. Greenhouse forcing is positive, as several watts per square meter of additional energy are radiated from the atmosphere back to the surface. Forcing due to clouds and other aerosols that reflect part of the solar energy back to space is negative. The degree of climate change depends primarily on the balance between the positive forcing by the greenhouse effect and the negative forcing by aerosols. During much of the Industrial Revolution, the two types of forcing were roughly balanced because the same industries that burned coal to release carbon dioxide also poured smoke into the atmosphere. Since World War II, the output of greenhouse gases has greatly increased—not just carbon dioxide but also methane and industrial chemicals such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). At the same time, environmentalists succeeded in reducing the emission of smoke and other aerosols. Thus we now have strong positive forcing, leading to rapid global warming.

Hansen goes further, however. He notes that the current system is not in equilibrium; we are receiving more heat than is being radiated back into space. It is this imbalance that causes rising temperature and is starting to melt the polar ice caps. Much of this excess heat is also going into the ocean reservoir. It is this heat sink that assures us that global warming will continue for several decades, even if greenhouse forcing is held steady or decreased.

We can see from studies of past climate that temperature and atmospheric carbon dioxide are highly correlated. Most previous climate changes were much more gradual than those we are experiencing today, but their magnitude has been quite large (5 degrees Celsius in both directions). Hansen calculated the forcing implied from paleoclimate data to estimate the equilibrium temperatures we can expect as a function of the CO_2 content of the atmosphere. He concludes that with the present CO_2 concentration, we will raise sea level by

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several meters at minimum due to melting ice. If the CO_2 should double or triple, which is likely if much of the Earth's coal deposits are mined and burned, we will slip into a new regime in which most of the ice caps will melt, raising the ocean level at least fifty meters, which was the level when Earth's atmosphere contained this much CO_2 in the past.

These considerations, based in interpretation of paleoclimate data, convinced Hansen of the existence of a *tipping point*, when the changes we are producing become irreversible (on human timescales). He believes that we are dangerously close to that tipping point, and he is a strong supporter of efforts to limit the CO_2 content of the atmosphere to 350 ppm (which requires a return to the level of the late 1980s). As he frequently asserts, meeting this goal precludes us from burning most coal deposits or trying to extract oil from tar shale and other difficult-to-use forms of hydrocarbons.

Hansen's proposed moratorium on coal-fired generating plants directly confronts our requirement for "base load," the steady electrical energy that cannot be supplied by solar or wind power. He describes a meeting with energy experts in Germany who said it was impossible to avoid building coal-fired generators because Germany is committed to a policy of phasing out nuclear energy. Hansen, reluctantly but firmly, is now an advocate for nuclear power, specifically for the new generation of clean-burning breeder reactors that can actually consume current radioactive waste. In reply to environmental organizations that oppose nuclear power, he notes that an estimated hundred thousand people per year die from exposure to coal, compared with at most a handful from our only serious nuclear accident at Chernobyl in 1986.

In his book we can see the gradual radicalization of Jim Hansen, self-described as a "placid, even comfortably stolid" atmospheric modeler and theorist. In 2006, *Time* magazine listed him among the 100 most influential people in the world. Hansen concludes this book by stressing that we face the most urgent fight of our lives and noting that civil resistance to new coal plants may be our only recourse.

* * *

Stephen H. Schneider, who died this summer (see "The Loss of Climate Scientist Stephen H. Schneider" in this issue), was a leading climate modeler much like Jim Hansen. But while Hansen is basically a reluctant public figure, Schneider epitomized the sophisticated scientist-politician; he was at home in the halls of Congress or on the front line of international climate negotiations. Winner of the MacArthur "genius" prize and co-recipient of the 2007 Nobel Peace Prize, he left NCAR for a senior professorship at Stanford University, providing him opportunities to mentor the next generation of atmospheric scientists. His wife, also a Stanford professor, is herself a world-class expert on the response of ecosystems to environmental change.

Schneider began to investigate the risk of climate change in the 1970s. As a graduate student he wrote a thesis on global *cooling*—when it appeared that negative climate forcing from smoke and other aerosols dominated over greenhouse heating, but the facts soon demonstrated otherwise. The danger of global warming was evident to many during the administration of Jimmy Carter, and a number of bipartisan government actions mandated increases in the efficiency of appliances and required substantial gains in automobile mileage performance. Schneider's first testimony before Congress was in 1979, a decade before Jim Hansen proclaimed the reality of global warming.

Two decades of bipartisan support for environmental science evaporated when Ronald Reagan became president. He and his appointees flatly denied the existence of either an energy problem or a threat of global warming. Famously, Reagan said that government is not the solution to our problems, it *is* the problem. The linked issues of energy policy and climate change have been sharply polarizing topics in the United States ever since.

In this book, Schneider recounts his personal story of the Climate Wars. The highlight—and the source of the book's title, *Science as a Contact Sport*—is his description of the Intergovernmental Panel on Climate Change (IPCC) and associated international events in which he participated, such as the 1992 Earth Summit in Rio de Janiero and the 1997 summit that approved the Kyoto Protocol. Along the way he also fought running battles with those who denied the reality of warming and used the media to distort and obfuscate climate science.

One of the common accusations of the climate contrarians is that the IPCC was a radical group in which alarmist scientists made unsupported statements about the dangers of global warming. It was thus with great interest that I read how this large international group, consisting of hundreds of scientists and thousands of reviewers and consultants, worked for three years on each of the three IPCC assessments. To hear the critics, one would think the radicals hijacked this process and then claimed consensus for their views. But as Schneider explains, the IPCC was forced to adopt the UN definition of "consensus," which is "unanimity." Every nation had to approve every word in the document, and even one veto could scuttle the entire process. Consequently, each statement of fact had to be documented, and every suggestion of policy approved by even the most conservative delegations.

Schneider's first-hand stories of these negotiations are fascinating. A handful of countries were the source of almost all of the objections: Saudi Arabia, the United States, China, and Russia—not coincidentally the biggest producers and consumers of hydrocarbons. One of the most frequent phrases in the IPCC notes is "Saudi Arabia, with the support of the United States, objected. . . ." Schneider also reports that many of the members of the official U.S. delegation admitted privately that they agreed with the majority of scien-

tists there but were under different orders from their bosses in Washington. He played a central role in finding compromises. At least once, he threatened to expose the obstructionist position of the U.S. delegation to the press and in congressional testimony scheduled for the next week. Schneider's description of the process explains why the IPCC assessments, far from being radical, have consistently underestimated future warming and its consequences.

Schneider's own contributions to the IPCC reports centered on providing meaningful estimates of uncertainties in both the anticipated climate changes and their likely effect on ecosystems and economies. Although the current state of the climate is measurable, all estimates of future trends are uncertain to varying degrees. Most of these predictions are based on computer models because, as Schneider often notes, you can't collect data about future conditions. To make such assessments useful to policymakers, the scientists must provide quantitative estimates of uncertainty, and Schneider insisted on a consistent vocabulary in the use of terms such as "likely," "very likely," and "high confidence level."

Schneider also describes his outrage in 1996 when the second IPCC assessment report was released. In a long letter published in the *Wall Street Journal*, solid state physicist Frederick Seitz personally attacked the lead author of the report, accusing him of a blatant attempt to "remove hints of the skepticism with which many scientists regard claims that human activities are having a major impact on climate" and claimed that this was a falsification intended to deceive the public and policymakers. The accusation was flatly untrue. But what amazed the scientists was that Seitz was a past president of the NAS. Why was Seitz, who was not a climate scientist, launching this personal attack—which was quickly echoed by Fred Singer, another senior scientist, in a *Wall Street Journal* article, "Coverup in the Greenhouse"?

At least once, Schneider threatened to expose the obstructionist position of the U.S. delegation to the press and in congressional testimony scheduled for the next week.

* * *

The third book in my trilogy deals with the role of contrarians like Fred Seitz and Fred Singer and their sophisticated campaign to undercut the science of global warming. They had previously also disputed the reality of ozone depletion and the links between cigarette smoking and cancer. These individuals and organizations are the "merchants of doubt" referred to in the title of the book by historians Naomi Oreskes and Erik Conway.

Merchants of Doubt places the attacks on climate science and the IPCC in a broader context. Seitz, Singer, and a handful of other scientists have waged a thirty-year campaign against a wide range of environmental issues. They followed what is often called the "Tobacco Strategy." In the 1950s and '60s, evidence rapidly grew that cigarette smoking causes lung cancer and a variety of other diseases. The tobacco industry could not prove this claim wrong, but they could and did try to undercut the science behind it. Internal tobacco memos state that "doubt is our product." Big Tobacco used science to fight science by funding a few pliable academic researchers and setting up nonprofit foundations and organizations that released "scientific reports" and engaged in other forms of "education." Although they lost this fight, their efforts delayed effective government action by more than two decades and indirectly led to the premature deaths of millions of smokers, who were happy to believe that the link between smoking and cancer had not been proven.

When evidence began to accumulate in the 1990s that there was also a link between secondhand smoke and disease, the same techniques were used by the tobacco companies, this time with the support of a few famous scientists such as Fred Seitz (former president not only of the NAS but of Rockefeller University), Fred Singer (first director of the National Weather Satellites Service), Bill Nierenberg (former director of the Scripps Institution of Oceanography), and Robert Jastrow (founding director of the NASA GISS).

These four retired physicists had worked on Cold War defense projects and held senior advisory positions in the Reagan administration. They first gained national prominence for their outspoken support of the Strategic Defense Initiative (SDI, commonly called "Star Wars"). Jastrow, Seitz, and Nierenberg founded the George C. Marshall Institute, a tax-exempt educational organization promoting "science for public policy" with a goal to "raise the level of scientific literacy . . . with an impact on national security." They were strongly anti-communist, opposed to co-existence or detente with the Soviet Union, and in favor of much larger defense budgets. Many of their education efforts

were directed at journalists and congressional staff. The Marshall Institute joined other think tanks with similar political goals, such as the Heritage Foundation, the Hoover Institution, the Hudson Institute, the Competitive Enterprise Institute, and the Cato Institute.

Oreskes and Conway describe several of their campaigns in detail, beginning with their assertions that a "Star Wars" missile-defense system was both feasible and affordable. As physicists who had worked on defense programs, their opinions had considerable weight. At the same time, however, they went well beyond their areas of expertise to question the environmental harm of acid rain and oppose regulations to reduce smokestack emissions. This campaign, led by Fred Singer (affiliated with the Heritage Foundation and a White House insider), placed them in direct opposition to the NAS and the Environmental Protection Agency. They were aligned with the Reagan administration, however. "We don't know what is causing it" became the official position of the U.S. government, and action was not taken to mitigate acid rain until 1990, under the first Bush administration.

Meanwhile, there was a growing scientific concern over depletion of ozone in the stratosphere. Ozone blocks shortwave ultraviolet sunlight that would otherwise be a risk for all life on land. The primary culprit was CFCs, which were used as refrigerants and spray-can propellants and to clean electronic components. Billions of pounds of CFCs were being manufactured every year. In their defense, the chemical companies, through their trade organizations, began to follow the tobacco strategy. They dispensed millions of dollars in research grants and established several organizations for public relations purposes, such as the Aerosol Education Bureau. The industry promoted the idea that volcanic eruptions, not CFCs, were destroying stratospheric ozone.

In 1985, public interest and concern were stimulated by the discovery of the Antarctic ozone hole. Suddenly the invisible chemical changes in the stratosphere were made visible by satellite images of the Antarctic. A counternarrative was soon developed, led by Fred Singer. Writing in the *Wall Street Journal*, Singer criticized the "ozone scare" and asserted that there is no proof of ozone depletion or of a cause-and-effect relationship with CFCs. His thesis was that the science is uncertain, replacing CFCs will be difficult and expensive, and the scientific community is corrupt and motivated by self-interest and political ideology—the same arguments later used by global warming deniers.

As late as 1995, after the Montreal Protocol had banned most manufacture of CFCs, Singer testified before Congress that the scientific concern about ozone depletion was simply "wrong." He attacked the Swedish Academy of Sciences when the Nobel Prize in Chemistry was given for analysis of stratospheric ozone chemistry. Singer described his motivation in 1989 this way: "There are probably those with hidden agendas of their own—not just to save the environment but to change our economic system. Some are socialists, some are technology hating Luddites; most have a great desire to regulate on as large a scale as possible." In 1991 he wrote that the real agenda of environmentalists was to destroy capitalism and replace it with some sort of worldwide utopian socialism—or perhaps communism. (All taken from *Merchants of Doubt*, which has extensive documentation.)

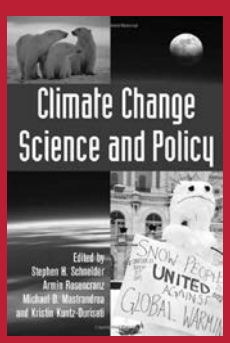
With this background, it is easier to understand Fred Seitz's 1996 attack on the second IPCC assessment. Actually, the Marshall Institute had begun attacking climate science in 1989, the year the Berlin Wall fell. The Institute published a booklet titled "Global Warming: What Does the Science Tell Us?" by Jastrow, Seitz, and Nierenberg, blaming whatever global warming might be happening on the Sun. Nierenberg himself briefed the report to the White House. The contrarians founded a faux-scientific journal called the *World Climate Review*, partly funded by fossil-fuel interests. They used the right-wing *Washington Times* and the *Wall Street Journal*, knowing that these papers would not publish rebuttals from the climate scientists.

Even as the scientific case for anthropogenic global warming became more secure, Senator James Inhofe (then-chair of the Senate Committee

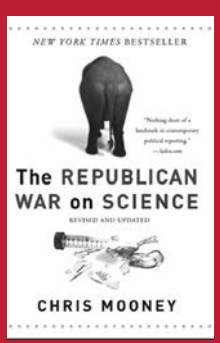
Additional Climate Wars Books

Several other recent books discuss climate change and its political context:

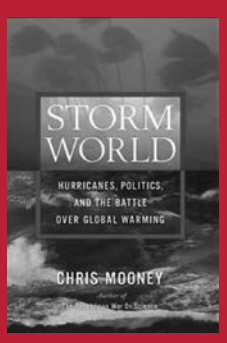
Climate Change Science and Policy
Stephen H. Schneider, et al. (eds.)



The Republican War on Science
Chris Mooney



Storm World: Hurricanes, Politics, and the Battle over Global Warming
Chris Mooney



on Environment and Public Works) called global warming "the greatest hoax ever perpetuated on the American people." In 1997, the U.S. Senate passed a resolution blocking adoption of the Kyoto Protocol by a vote of 97–0. In Washington, politics, money, and ideology were in ascendancy over science. The situation became even worse under George W. Bush, with the spectacle of science-fiction writer Michael Crichton appearing as an expert witness before Congress and lecturing at the White House on global warming.

The preceding paragraphs only hint at the detailed history of the science-contrarian movement described by Oreskes and Conway. It is frankly difficult for a scientist to believe that other scientists would consciously misrepresent the scientific facts, but the pattern is inescapable, as Seitz and Singer and a handful of others have taken the same denialist position on one issue after another: tobacco and cancer, acid rain, ozone depletion, DDT, secondhand smoke, and now global warming. As documented in this book, these contrarians are fighting science because of their political conviction that government regulations are in themselves evil. They believe that environmentalism leads to regulation, which will inevitably lead to the loss of our freedom. They call environmentalists watermelons: green on the outside but red on the inside. Having fought for freedom all their lives against the evils of communism, they are now fighting just as hard to protect our liberty from the evils of government regulation. That mission apparently trumps their devotion to science.

* * *

These three books were written before the "climategate" accusations of late 2009, which were used effectively to smear the IPCC specifically and climate scientists generally. Most of the media went along with this sophisticated public-relations campaign, describing this as the greatest crisis faced by science in a generation. Some media later printed retractions and even apologized when impartial investigations showed that the accusations were false. But this episode demonstrated the ability of the contrarians to influence public opinion. I imagine that Oreskes and Conway could add this episode to their long list of public-relations battles, but it did nothing to undercut the reality of global warming or the serious implications it has for our future.

There are many parallels between this campaign against climate science and the widespread efforts to deny biological evolution and block its inclusion in science classes. Both climate denialism and evolution denialism are efforts to fight real science with pseudoscience—these contrarians publish fake science in nonrefereed journals, found NGOs, and use sophisticated marketing in the halls of power from Washington to Austin. Apparently even good scientists can be seduced by a strong ideological commitment, just as the creationists are much more interested in saving our souls than in addressing the science of biology. Like creationists, the climate contrarians are "merchants of doubt," using pseudoscience to undercut real science and create a wedge for their nonscientific beliefs.

I recommend all three of these books. They are well written, timely, and provocative. Hansen emphasizes the science and introduces some novel ways to assess future warming without invoking complex computer models. Schneider paints a fascinating picture of the struggle to develop a consensus on global warming, especially through the UN IPCC assessments. Oreskes and Conway place the climate controversy in perspective as the most recent example of how ideology and politics have been used (with considerable success) to attack science. Their message is one that skeptics everywhere will want to read and ponder.

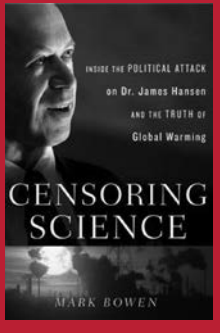
Note

Of the four leading climate denialists discussed here, only Fred Singer is still going strong. Bill Nierenberg died in 2000, and both Frederick Seitz and Robert Jastrow died in 2010.

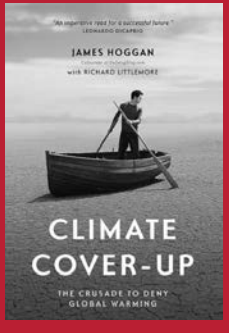
I thank several colleagues for helping to educate me on climate science or for offering constructive criticism of this manuscript: Mark Boslough, Clark Chapman, Bob Chatfield, Erik Conway, John Mashey, Naomi Oreskes, Phillip Russell, and Eugenie Scott.

David Morrison is a CSI fellow who divides his time between the SETI Institute, where he is director of the Carl Sagan Center for the Study of Life in the Universe, and the NASA Lunar Science Institute. Although he is a planetary scientist, not a climate scientist, he has followed the growing climate crisis with alarm over the past decade.

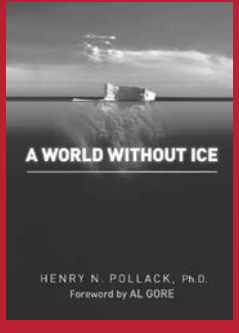
Censoring Science: Inside the Political Attack on Dr. James Hansen and the Truth of Global Warming
Mark Bowen

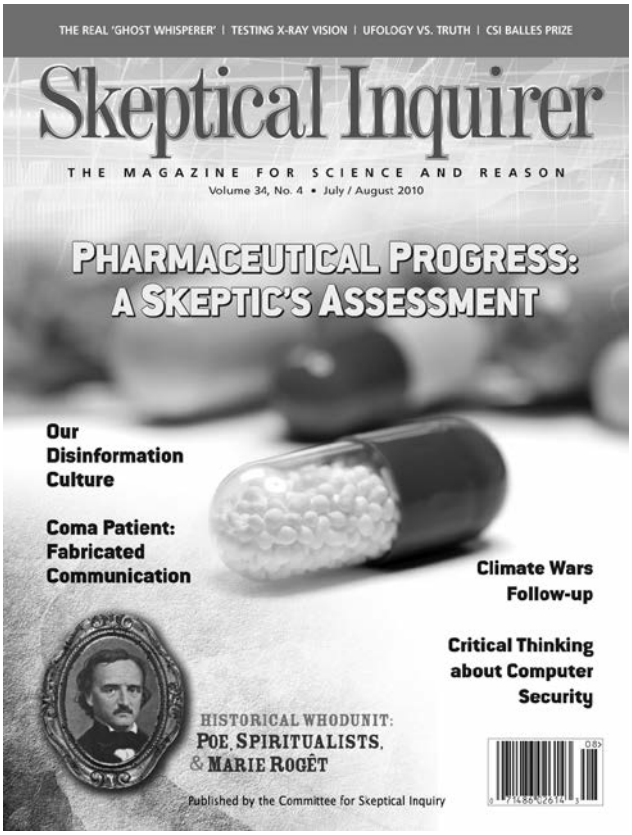


Climate Cover-Up: The Crusade to Deny Global Warming
James Hoggan with Richard Littlemore



A World Without Ice
Henry N. Pollack




THE REAL 'GHOST WHISPERER' | TESTING X-RAY VISION | UFOLOGY VS. TRUTH | CSI BALLES PRIZE
Skeptical Inquirer
THE MAGAZINE FOR SCIENCE AND REASON
Volume 34, No. 4 • July / August 2010
PHARMACEUTICAL PROGRESS: A SKEPTIC'S ASSESSMENT
Our Disinformation Culture
Coma Patient: Fabricated Communication
Climate Wars Follow-up
Critical Thinking about Computer Security
HISTORICAL WHODUNIT: POE, SPIRITUALISTS, & MARIE ROGÊT
Published by the Committee for Skeptical Inquiry

Pharmaceutical Progress

Dr. Reynold Spector provides solid evidence that the pharmaceutical industry produced numerous valuable medications to treat or ameliorate diseases over the past fifty years ("A Skeptic's View of Pharmaceutical Progress," SI, July/August 2010). It appears the article was written primarily to "rate" the usefulness of this segment of our society in view of its rapidly deteriorating public image. Of course Big Pharma is not a collective but an amalgamation of very different companies, most of whom are purely driven by a desire to make money.

What I submit is that maybe the reason for the perceived moral downfall of Big Pharma in the past decades is the peculiar environment in which it operates. There is encouragement of development of "marginal" products that can still be marketed profitably, because in this un-free market the one being marketed to (the doctor and—through TV ads—the patient) is not the one paying for the drug, at least not directly. Because the development of dubious drugs is often less risky than going after truly innovative compounds, board members will change their attitude toward support of worthy products only if the commercial incentive for marginal products decreases. This has happened in many countries through limiting reimbursement, and it will also happen in the United States, though with some delay, through the same process. One other change that may occur in pharmaceutical research and development is a shift from looking for small improvements for many patients to looking for large improvements for select patient groups, something unfortunately not compatible with the blockbuster concept that brought the industry to power.

Roland Gerritsen van der Hoop, MD, PhD
RGH Pharma Consulting LLC
West Chester, Pennsylvania

Reynold Spector's article "A Skeptic's View of Pharmaceutical Progress" is a great disservice to the readership of SI. His misrepresentation of statins as "ideal drugs" with "near universal agreement … that moderate doses of statins … substantially decrease death … and heart attacks and strokes" disregards the decades-long outcry from MDs, PhDs, and science writers who have provided a thorough analysis of the lack of justification for the use of cholesterol-lowering medication. For the benefit of SI's readership, I urge SI to request a rebuttal to Spector's inaccurate portrayal of the safety and effectiveness of statins as a treatment for coronary heart disease (CHD) from scholars who have written extensively on this subject, such as Uffe Ravnskov, MD, PhD; Duane Graveline, MD; Joel Kauffman, PhD; Paul Rosch, MD; William Stehbens, MD; Barry Groves, and Anthony Colpo.

A thorough response to Spector's assessment of the value of statins to CHD treatment would require a review of the history of the fallacy that cholesterol causes CHD (which has been provided by the individuals named above). Here, I'll provide three of the five flaws in Spector's so-called "conservative" estimate that statins could save the lives of 600,000 Americans, which he proposed based on the findings of the Scandinavian Simvastatin Survival Study (4S) (1994). First, the 4S study was limited to people with hypercholesterolemia—the average cholesterol level for the subjects was 264 mg/dl. Only a minority of people with CHD exhibit hypercholesterolemia, which thereby limits the application of the 4S findings to a small subset of those with CHD. Second, the 4S study showed no significant effect of statin treatment on all-cause mortality in women. Only fifty-two women died in the trial, twenty-five in the placebo group and twenty-seven in the statin treatment group, which means that its findings are relevant only to hypercholesterolemic men. Finally, Spector suggested that different treatments in combination with statins would produce an additive factor in promoting survival, a statement that is not supported by any scientific evidence. Indeed, the authors of the paper Spector cited stated they "could not find differences in outcome among patients receiving ACE inhibitors with or without … lipid lowering therapy" (Baker et al. 2009, 868). Thus, Spector's estimate of 600,000 people saved by statins is derived more from his imagination than empirical evidence.

Once we realize that the absolute difference in survival is a mere 1.2 percent in statin-treated vs. untreated subjects under ideal experimenter-controlled conditions, and we consider the hazards of low cholesterol levels on health and mortality (reviewed in Colpo 2006; Groves 2008), then the appeal of statins loses its luster. Overall, with the obvious pharmaceutical-friendly bias in Spector's article, SI failed to provide its readership with a sufficiently skeptical perspective on the limited effectiveness of statins to reduce CHD-related mortality.

David Diamond, PhD
Professor, Depts. of Psychology, Molecular Pharmacology, and Physiology
University of South Florida
Tampa, Florida

Reynold Spector replies to David Diamond:

Diamond appears not to have read my paper carefully. First, I was talking about secondary prevention. References to primary prevention are not relevant. I would point out that there is a lot of other work that supports the mortality advantage of statins in secondary prevention, such as the huge five-year Long-term Intervention with Pravastatin in Ischemic Disease (LIPID) trial (which studied coronary artery disease [CAD] patients with lower cholesterol concentrations) and showed a 22 percent reduction in mortality (P< .001) with pravastatin versus placebo. I also was very conservative in my estimates. I assumed that there were ten million patients with CAD who took statins, but there are actually twenty million such patients in the United States; I thus underestimated the potential benefit. Second, there are two large, recent, controlled trials in women that show the benefit of statins. I could go on and on, but Diamond selectively references the literature and needs to do his homework better. I imagine that if he developed CAD, his physician would put him on 40 mg of simvastatin and he would probably take it and have no side effects. Because the drug is generic, he could find it at low cost. Is he somehow different than the patients in the 4S, LIPID, and Heart Protection Study trials?

Reynold Spector's article "A Skeptic's View of Pharmaceutical Progress" includes several observations about how certain drugs have improved outcomes (e.g., "reducing cervical cancer in women by about 70 percent"), while failing to provide actual values—from how many women, to how many? A reduction in deaths from two in ten to one in ten and a reduction from two in a million to one in a million both represent the same percentage reduction, but in the first case the difference is very significant while in the second, it just doesn't matter. Failing to provide actual numbers of those who are affected makes the information virtually useless.

Reporting research results in terms of percentage improvement without providing context can make even insignificant improvements seem very impressive. I don't know whether it's the researchers or the reporters who produce the articles who are responsible, but either way it's potentially very misleading.

Isaac Wingfield
San Jose, California

Reynold Spector replies to Isaac Wingfield:

According to the American Cancer Society, over 300,000 women worldwide die of cervical cancer each year. Hence, if all young women received the human papillomavirus (HPV) vaccine, there would be 200,000 fewer deaths from cervical cancer per year. This is obviously not a trivial number.

Blindsided by Disinformation

Thanks for the insightful article by Alan J. Scott, which distills a great deal of information about how big money often frames the debate and distorts (or fabricates) scientific information ("Blindsided by a Culture of Disinformation," SI, July/August 2010).

The classic examples in the United States include the tobacco lobby's suppression of information on the health dangers of smoking, the health insurance and pharmaceutical industries' distortion of the operations of the Canadian healthcare system, the fossil fuel interests' denial of the reality of the global climate crisis, and the crass efforts to market homeopathic and other "alternative" medical practices.

However, there are other disturbing examples of disinformation not so readily tied to big money. Perhaps the worst is the suppression of information about evolution, so that roughly half of our children are never taught about this fundamental cornerstone of science. In this case, the denialism is largely driven by organized religion. There is also the widespread belief that aliens are visiting us and that the governments of the world are concealing this information.

More recently, and of particular interest to me, is the conviction held by substantial numbers of people that the world will end, or at least that there will be a global catastrophe, on December 21, 2012. There is no evidence whatever for this fear of a 2012 doomsday, which has been manufactured out of nothing through Internet blogs and YouTube videos.

The existence of such weird ideas lacks the danger of the big lies about tobacco, health care, climate change, and homeopathy—however, these ideas are propagated in much the same way, primarily through disinformation campaigns on the Internet. They also are often framed in terms of government conspiracies to suppress the truth. The "culture of disinformation" and its corollary—distrust of government and the scientific community—has become a part of our landscape, and not all of it is driven by big business.

David Morrison
Director, NASA Lunar Science Institute
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Physics professor Alan J. Scott is on firm ground until he says

> . . . working for social and economic justice . . . compels us to resist deficit spending. Some people will counter this argument with intellectually bankrupt reasoning such as "Deficit spending is OK provided the economy continues to grow and it is only a small percentage of our GDP." These arguments are an institutionalized economic/environmental pyramid scheme waiting to come unraveled.

Talk about disinformation! Apparently Mr. Scott considers three of the world's leading economists to be "intellectually bankrupt" and engaged in maintaining a "pyramid scheme." Nobel laureate Paul Krugman has been uncompromisingly clear that immediate growth and job creation through further stimulus spending trumps the dangers of the deficits that such spending creates; a glance at some of his recent columns in the *New York Times* is instructive. Nobel laureate Joseph Stiglitz echoes Mr. Krugman, speaking widely on the dangers of deficit reduction (particularly in a poor economy with high unemployment) and going so far as to tell President Obama not to give in to "deficit fetishism." Even the more conservative economist Nouriel Roubini has stated that although he is extremely concerned about the deficit, he remains equally concerned about unemployment and slow growth. In fact, his all-but-exclusive recommendation for correcting both problems is raising taxes—something that the GOP in particular is simply never going to allow to happen.

Ian Alterman
New York, New York

I was dismayed to read Alan J. Scott's article, not because it is incorrect but because it deals with politics rather than science. Of course there is a lot of

disinformation disseminated in politics, whether or not science is involved, but that disinformation is generally on all sides, and it is necessary for a thinking person to discriminate between the noise and the data.

Although I think the author of this article believes he is unbiased, his biases with respect to corporations and government are clearly evident from his one-sided examples. Governmental, scientific, educational, and environmental organizations can represent "special interests" just as much as corporations can. Though this subject is interesting, it does not belong in a scientific journal. As a long-term subscriber to SI, I would like to see the Committee for Skeptical Inquiry stick to science and avoid politics, which usually doesn't lend itself to skeptical inquiry.

Allen Ginzburg
Aptos, California

Climate Wars Coverage

Re: "Climate Wars" and the "Follow-Up" section exchanges in the July/August 2010 issue of SI:

Perhaps the most prescient thing about Al Gore's *Inconvenient Truth* was his choice of title. It appears that the truth of any issue of economic or ideological importance cannot or will not be agreed upon as either true or false, because convenience trumps truth every time. Consider some examples, which I have divided not by "truth" but by "convenience." Among convenient claims I offer: the ozone hole, lead in paint and gasoline, asbestos, secondhand smoke, health foods and supplements, diets and exercise, and religion of all sorts. I categorize these as "convenient" because they are problems that have ready and profitable solutions, or they appeal to the ideology of the majority of people.

Taking just the first item, the ozone hole, as an example, it really doesn't matter if the ozone hole will lead to environmental damage (increased skin cancer among polar bears or penguins?) because alternatives to Freon will be readily available and are conveniently more profitable once the use of cheap CFCs has been assassinated. One can go through the rest of the list and make similar arguments. I have intentionally chosen items that most skeptics would rate as ranging from "certainly true" to "certainly false" to emphasize my point that truth doesn't much matter if the claim is "convenient."

My list of "inconvenient" claims is shorter: global climate change, world overpopulation, and biological evolution. Each of these is an issue for which there is not a "convenient" (read "profitable") solution, and/or they represent ideological conflicts of conscience. Even though it would seem that an "inconvenient untruth" should be a nonstarter, the "truth" of each of these items has been challenged, obfuscated, and even denied, leaving the general public ignorant of whether the claim is true or not. So again, convenience trumps truth, and we are left with the dismal conclusion that any claim of economic or ideological importance cannot be proved to general agreement, either way. Perhaps the best guide in such controversies is "follow the money."

Alan Harris
La Cañada, California

I found the exchange between Robert Sheaffer, Mark Boslough, et al., in the July/August SI ("Climate Wars Follow-Up") disappointing for two reasons: first, Robert Sheaffer, who is usually a thorough and reasonable skeptic, made so many erroneous claims. Second, the responses to him failed to do two things that adequate responses should: They failed (with few exceptions) to *rebut his errors*, and they didn't *acknowledge the parts of his critique that were correct or put them into proper context*. Yet this should have been quite easy to do—in fact, there is a website that already does it, John Cook's *Skeptical Science*.

As an example of the former, Sheaffer lists "40 percent of the Amazon rain forest is threatened by global warming" as a false claim of the 2007 IPCC AR4 report. In fact, the claim is correct; the only error in the IPCC AR4 report was to cite the wrong source for the claim. The "Amazongate" charges originated with poor research by Richard North and were promulgated in a *Sunday Times* (United Kingdom) story by Jonathan Leake. The *Times* was forced to retract and apologize for the erroneous story, as described on the *Real Climate* blog (www.realclimate.org/index.php/archives/2010/06/leakegate-a-retraction/).

As an example of the latter, Sheaffer is correct that the IPCC WGII report on Himalayan glaciers was in error, as has been widely reported. I think it's important to distinguish between the three IPCC working groups—WGI, research on the physical basis of climate change; WGII, research on scientific, technical, environmental, and social aspects of climate change (e.g., vulnerability and adaptation); and WGIII, research on mitigation of climate change. It's my impression that the work in WGII has received more substantive criticisms than that in WGI (e.g., by Roger Pielke Jr., who has complained about his own work being misrepresented by WGII yet supports the results of WGI [see, for example, http://lippard.blogspot.com/2009/11/roger-pielke-jr-on-climate-change_07.html]).

Cook's *Skeptical Science* website addresses most of the claims Sheaffer has made in a numbered list sorted by recent popularity (www.skeptcalscience.com/argument.php). As of this writing, the site addresses 116 arguments from climate change skeptics, including the following from Sheaffer: global warming is due to the sun (#1), the weather hasn't warmed since 1998 (#7), we're heading into a new Little Ice Age (#9), the "hockey stick" is broken (#18), the Medieval Warm Period was warmer than today (#56), the IPCC was wrong about Himalayan glaciers (#75), Michael Mann performed a trick in *Nature* to "hide the decline" (#77), and the IPCC was wrong about Amazon rainforests (#94).

Jim Lippard
Phoenix, Arizona

I have just lost all respect for Robert Sheaffer. His take on SKEPTICAL INQUIRER'S coverage of "Climategate" is a verbatim recitation of the thoroughly discredited received "wisdom" of anthropogenic global warming (AGW)-denier orthodoxy. He didn't miss a note. Almost everything in his piece is false, misleading, or non sequitur, as well as simply a parroting of widespread AGW-denier talking points, showing no critical thinking on his part. Sheaffer's response is too long and too silly to rebut every point in a letter to the editor, but it is laughable that AGW deniers think that personal enrichment through science grants and subsidies for alternate energy development is in the same league of corruption-inducing financial influence as the vast profits and entrenched interests of the fossil-fuel industry.

It is distressing that a self-identified skeptic would be incapable of viewing AGW-denier nonsense with a skeptical eye. It is certainly true that the IPCC report contains some errors, but none of them overturn the massive body of evidence that AGW is real and a threat to our civilization. Sheaffer and the rest of the AGW deniers have uncritically bought into a pseudoscience cynically perpetrated by the

fossil-fuel industry. They hold legitimate climate scientists to an inhuman standard of perfection yet give AGW deniers a free pass on logic, evidence, accountability, and integrity.

Jason Spicer
Washougal, Washington

Robert Sheaffer's argument that climate scientists are lying about global warming to get funding for their research made a lot of sense to me. Imagine a young man, desperate to make his fortune, deciding what to study in college. Should he study business or environmental science? Well, the decision seems obvious. Nobody's ever made any money in business. Scientific research into weather . . . now that's where the money is!

And yes, I'm being sarcastic.

R. Allen Gilliam
Winter Park, Florida

Computer Security

As a skeptic who happens to work in the security software industry (I'm the country manager of a German software company that develops antivirus software), I want to briefly comment on some points in Adam Slagell's article on computer security ("Thinking Critically about Computer Security Trade-offs," SI, July/August 2010).

Slagell is absolutely right that there is no such thing as 100 percent security, and people should be skeptical about offers making this claim. He also correctly states that security software relying on only "traditional" signature-based malware detection is no longer an adequate form of protection.

My main objection to Slagell's argument concerns his explanation of why he leans toward use of a virtual machine (instead of running antivirus software) to be able to "do something that may risk infection of your computer, and revert back to that clean state afterwards." The danger here is in the underlying assumption that the computer user will always be aware of the fact that his or her computer is infected. This is certainly no longer the case for the average computer user: malware these days is usually no longer intended to cause damage—but rather to infect your computer and remain hidden for as long as possible, thus allowing the cybercrime community to use your computer (e.g., for sending spam or storing illegal content). The malware industry is big business, and the average computer user is not in a position to judge the ever-changing threats adequately.

As for Slagell's remarks that security software is using an excessive amount of computer resources and that local firewalls are often generating quite cryptic messages: this indeed was the case a couple of years ago, but great improvements have been made in the past two years. The latest generation of security software uses a multitude of techniques (virus definitions, behavior blocking, heuristics, cloud technology, white-listing, etc.) to reach detection levels that are indeed very close to 100 percent. Most vendors provide a free trial version on their website, so you don't have to simply take my word for it. You can also find comparative information on independent websites like www.av-comparatives.org and www.avtest.org.

One last piece of advice—from an insider—on FUD (Fear, Uncertainty, and Doubt): Please don't believe those security vendors that try to sell you an antivirus solution for your smartphone. There are only a handful of viruses for those operating systems (compared to millions for desktop-based Windows versions), and none of them is a real threat or has a money-earning system behind it (the driving force in the malware industry). So there is no reason whatsoever to pay that $30 or $40 fee every year. The biggest threats to your smartphone are having it stolen or forgetting to take it out of your pocket when putting your trousers in the laundry basket.

Jan Van Haver
Hamme, Belgium

Adam Slagell's "Thinking Critically about Computer Security Trade-offs" is good, but I do have a comment about effective (home) computer security.

His comment about virtual machines is excellent and correct, but I use a different system. I use two computers (one I was about to donate after upgrading to a newer machine). The older, slower machine is now exclusively for browsing the net. It has an operating system, a browser, and some security (not much: Spybot and the MS firewall). The newer, faster machine is for everything else and is very secure. The important point is the "secure" machine cannot connect to the web. Period. I run the two machines with an MKR switch that lets me run the two with one keyboard/mouse/monitor.

If I absolutely must transfer something between the two machines, I manually plug in a thumb drive and manually move it over to the other machine.

If the browser machine gets anything at all, I reformat the hard drive (or even wipe it completely if it looks really nasty) and reinstall from a clean backup, which I make a few minutes after I finish installing software. This takes about twenty minutes, most of which is wait time.

My system can be called "parallel," but I have a geeky friend who uses the more sophisticated "series" method. This friend has two machines, and everything must pass through the first machine before reaching the second. The first is protected to the max, and the second is also super protected but with different products that might otherwise conflict.

Rudy Iwasko
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The section on "password mythology" in Slagell's article missed one myth: that changing passwords periodically makes them more secure. This will provide protection only if a password is changed during an actual password attack, and even then it's highly unlikely.

Requirements for periodic password changes typically use an interval of months, whereas an attack takes hours at most. What frequently changing passwords does achieve is increasing the difficulty of remembering them, which leads to the users leaving passwords in places where someone can find them.

Dick Dunn
Hygiene, Colorado

Science and Moral Questions

Massimo Pigliucci asks, with Sam Harris, if science can answer moral questions ("Thinking about Science" column, July/August 2010).

Harris says yes; Pigliucci wonders. I say that science has its own internal morality. Science is a social endeavor, and therefore it requires its own social norms to survive. Science's values include honesty, self-honesty, precision, clarity, rigorous logic, skepticism, curiosity, open-mindedness, respect for evidence, irreverence for illogical authority, and much else.

Science enforces its internal values by reward and punishment; that's normal for morality. Some of these values are in conflict (e.g., open-mindedness and rigor); that too is normal for morality. So there's no such thing as value-free

science, nor should there be. But science's internal morality, though real, is not universal because other vocations have different moralities. Irreverence for illogical authority, for instance, is not well regarded in religion or in the military.

Nathaniel Hellerstein
San Francisco, California

Massimo Pigliucci, in his discussion of Sam Harris's book *The End of Faith*, takes the position that morality cannot arise from science. At least the model proposed by Harris cannot.

I disagree. Here is a model of such.

Let's build an argument that pulls morals, values, good, evil, and religious beliefs out of the equation. Let's take an argument that affirms something and build that argument on science. Some of the very basic laws of science are the three laws of thermodynamics—or the laws of entropy.

Without getting technical, the three laws are:

1. You can't win.
2. You can't break even.
3. You can't leave the game.

But there is another side to the universe that works against entropy called *syntropy,* a word invented by Buckminster Fuller as the direct opposite of entropy. While entropy runs things down, syntropy build things up. The main driver of syntropy is life—living systems—which contests the entropy of the physical world by creating order and designs of ever more advantageous and orderly patterns for growth. That which supports growth is syntropic. That which supports destruction is entropic. Those beliefs and actions that are advantageous to the advancement of life are syntropic. Those that are not are entropic. That which creates environments for creativity, like personal freedom, is syntropic. That which stunts personal freedom is entropic. Syntropy is good for human beings. Entropy is not. What's right for entropy is wrong for syntropy.

Thus, what we call morality and values are syntropic, and our personal, social, and cultural actions should encourage that which is syntropic in order to build a moral system.

Frank Fiore
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Psi Rationalism #1

In the July/August "Letters to the Editor" section, Chris Carter stated: "With psi we have the added complication that we are dealing with a purported human ability, and few human abilities are perfectly replicable on demand. To use a baseball analogy, home runs are not perfectly replicable on demand, but that does not mean that home runs do not exist." This argument is often used to explain why some people, some tests, and some people on some days, etc., either display or do not display psi abilities. This seems to be a much-believed condition of human beings, and it is used to dismiss the negative results (misses).

This made me wonder: out of all the vast human abilities—instinctive/innate (like the senses), learned—both mentally and physically (everything from reading to walking to mental arithmetic; throw in all the abilities shown at the Olympics, too)—are there *any other* human abilities that have been given this excuse?
I suspect the answer is no.
If psi ability is rooted deep in the brain yet is somehow this variable, why aren't other human abilities the same? "Hmmm, that's weird. I can't smell the coffee this morning. My sense of smell is not functioning. This happens a few times a month."

Although the degree of performance does vary from day to day among athletes, they never simply can't perform an ability that they were previously documented as having. Has Lance Armstrong ever woken up and said "Sorry, guys. I just can't remember how to ride a bicycle today." Has your accountant, doctor, or bus driver ever completely lost their abilities for a single day?

So why do the psi researchers use this explanation of psi abilities?

Joel McGinley
Merritt Island, Florida

Impossible or Merely Unlikely?

Robert Sheaffer's "UFOlogy vs. Truth" in the July/August 2010 issue is a fascinating essay.

The fact is that alien-spaceship UFOs are *impossible* because they violate simple principles of physics and chemistry. The amount of energy required to launch an alien ship is so huge—because of the vastness of interstellar space—that no civilization can possibly get such a vehicle off the ground. The figures are given in the June 2008 *Skeptical Briefs* on page 3.

It is unfortunate that honest investigators and skeptics have spent so much time chasing an impossible dream (or nightmare) that can be demolished with a few familiar and simple energy equations.

Sid Deutsch
Sarasota, Florida

Robert Sheaffer replies:

Impossible *is an awfully strong word, Mr. Deutsch! You say that such a vehicle could never be gotten off the ground. Neither could the International Space Station, which is why it was assembled in orbit. I agree with all your calculations showing the extreme difficulty in generating sufficient energy to accelerate payload (and return fuel!) to sufficient velocity for interstellar travel and then to decelerate decades or centuries later, at the very minimum. Another difficulty somehow has escaped notice: the difficulty of predicting what natural selection will do inside the ship's ecosystem after a few hundred or thousand generations of organisms. A ship might arrive at its stellar destination with its interior filled mainly with green slime mold.*

But none of these are the same as "impossible." Interstellar travel might possibly be accomplished should some factor such as the following apply: a race with an extremely long lifespan for whom centuries are not considered "too long" to travel; a ship with an entirely robotic crew that can operate for tens of thousands of years or more; an intelligent race with an insect-like social structure that would willingly dedicate many generations to the exploration. All of these suppositions strike me as unlikely in the extreme, but I would not call any of them "impossible."

Famous Strategies with Cranks

Related to Martin Bridgstock's article about responding to "dissenters" ("Encounters with Aliens [the Local Kind])" SI, March/April 2010) and the resulting Letters to the Editor (SI, July/August 2010), it is not surprising that Albert Einstein was apparently contacted by early dissenters. I have a 1931 letter that Einstein wrote to just such an individual, a Mr. Krumm who apparently sent an inquiry about a certain "problem." Interestingly, Einstein actually replied.

The German translates to something like this: "Very honored gentleman, It has been scientifically proven that the problem you mention cannot be solved. Anyway, as I am already overwhelmed with work, I cannot devote any time to such a hopeless case. With excellent [could possibly be translated as *greatest*] respect, Albert Einstein."

While pointing out that this is a "hopeless case," Einstein is still respectful to the "Very honored gentleman" he replies to "With excellent respect." Perhaps his responding and his being respectful demonstrates something about Einstein, because most of the time the scientist who receives such a communication ignores it.

It appears that Einstein did not use stationery but simply grabbed the nearest piece of paper for his response. The paper seems to be an 8¾ by 11¼ sheet from a graph paper pad that physicists and scientists frequently used and often had about their offices or laboratories.

Tom L. Smith, PhD
Principal Statistician
Dept. of Psychiatry
School of Medicine
University of California,
San Diego

Philip McEvoy's memory is at fault (Letters, July/August 2010). It was not Isaac Asimov but Sir Arthur C. Clarke, in his essay "Dear Sir" (found in his book *Voices from the Sky*), who said that cranks could be dealt with by sending a reply—purporting to be from one's secretary—saying that it would be brought to the intended recipient's attention when he was again permitted to deal with his mail, or by sending a deliberately illegible handwritten letter.

Ray Ward
London, United Kingdom

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Date of filing: September 16, 2010. Title: The Skeptical Inquirer. Frequency of issue: Bimonthly. Complete mailing address of known office of publication: 3965 Rensch Rd., Amherst, NY 14228-2713; P.O. Box 703, Amherst, NY 14226-0703. Publisher: CSI (Committee for Skeptical Inquiry), Inc., 3965 Rensch Rd., Amherst, NY 14228-2713; P.O. Box 703, Amherst, NY 14226-0703. Editor: Kendrick Frazier, 944 Deer Dr. NE, Albuquerque, NM 87122-1339. Managing Editor: Benjamin T. Radford, PO Box 3016, Corrales, NM 87048-3016. Owner: CSI (Committee for Skeptical Inquiry), Inc., 3965 Rensch Rd., Amherst, NY 14228-2713; P.O. Box 703, Amherst, NY 14226-0703. Known bondholders, mortgagees, and other security holders: None. Average number of copies of each issue during the preceding 12 months: (a) Total number of copies (net press run) 44,274. (b) Paid and/or requested circulation: (1) Paid/requested outside-county mail subscriptions stated on form 3541: 19,429. (2) Paid in-county subscriptions stated on form 3541: 0. (3) Sales through dealers and carriers, street vendors, counter sales, and other non-USPS paid distribution: 9,148. (4) Other classes mailed through the USPS: 23. (c) Total paid and/or requested circulation (sum of b[1], [2], [3], [4]): 28,600. (d) Free distribution by mail (samples, complimentary, and other free): (1) Outside-county as stated on form 3541: 897. (2) In-county as stated on form 3541: 0. (3) Other classes mailed through the USPS: 100. (4) Free distribution outside the mail (by carriers or other means): 0. (e) Total free distribution (sum of d) 997. (f) Total distribution (sum of c and e) 29,597. (g) Copies not distributed: 14,677. (h) Total (sum of f and g): 44,274. Percent paid and/or requested circulation (c divided by h times 100): 96.66%. Number of copies of the single issue published nearest to filing date: (a) Total number of copies (net press run) 41,268. (b) Paid and/or requested circulation: (1) Paid/requested outside-county mail subscriptions stated on form 3541: 17,595. (2) Paid in-county subscriptions stated on form 3541: 0. (3) Sales through dealers and carriers, street vendors, counter sales, and other non-USPS paid distribution: 8,730. (4) Other classes mailed through the USPS: 3. (c) Total paid and/or requested circulation (sum of b[1], [2], [3], [4]): 26,328. (d) Free distribution by mail (samples, complimentary, and other free): (1) Outside-county as stated on form 3541: 870. (2) In-county as stated on form 3541: 0. (3) Other classes mailed through the USPS: 100. (4) Free distribution outside the mail (by carriers or other means): 0. (e) Total free distribution (sum of d) 970. (f) Total distribution (sum of c and e) 27,298. (g) Copies not distributed: 13,970. (h) Total (sum of f and g): 41,268. Percent paid and/or requested circulation (c divided by h times 100): 96.47%.

[FEEDBACK

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Rational Wiki

Ghost Hunters

Ghost Hunters, is a ~~comedy~~ television show featuring the exploits of a group of mildly challenged ~~plumbers~~ paranormal investigators as they misuse a bunch of consumer electronics from their local ~~Circuit City~~ Best Buy in an effort to find "evidence" of paranormal activity. The core team is comprised of members of *The Atlantic Paranormal Society* (TAPS). When not appearing in episodes of this series, the crew enjoy posing for photos for the *Ghost Hunters* website, in which they aim to appear thoughtful, skeptical, or mysterious, but in most cases the overall impression is one of puzzlement and constipation. To the skeptic, the only reason to watch is to play the "lowest IQ in this segment" competition; that and some of the team are reasonably attractive in a confused kind of way.

An episode in a nutshell

The typical American segment consists of a situation in which someone is under the impression that they're witnessing paranormal activity. They call ~~Ghostbusters~~ TAPS, whose principals quickly remove their arms from the s-bends of whatever toilets they were unplugging in order to rush to investigate the alleged haunting.

The investigators then ~~strap on their proton packs~~ pile up a bunch of random electronic hardware in their vans, and go ~~blow the crap out of some ghosts~~ interview the deluded people who are convinced that they see dead people, and are desperate to have their superstitious ideas confirmed by fully qualified plumbers.

The plumbers then proceed to make the Nixon White House plumbers look brilliant, as they generally set up gear to record whatever noise, wow, and flutter they can. Cameras are set up in the dark, and sound recorders in silent rooms. They let the equipment run unattended for a few hours, while wandering around misusing other equipment, such as the magical "EMF detector."

They then go home to some dump in Jersey, pore over the blank tapes and get really excited about what white noise sounds and looks like when the gain is turned up all the way.

The last step is to return to the scene of the slime and tell the morons, in most cases, *that there really is something going on there!!!* Once in a while they act "skeptical" and say there might be a haunting, but that they didn't couldn't find strong evidence for it. They also occasionally unclog the ~~mark's~~ haunting victim's toilet—evidently for free!

Suggested equipment

The *Ghost Hunters* team is kind enough to provide Steve's list of equipment for budding paranormal investigators. If you follow the references and read the *Ghost Hunters* descriptions of these devices, you'll notice a distinct lack of evidence. Claims for the effectiveness of a device or will typically be backed by claims beginning with the phrase "many paranormal investigators believe…". As you review the list, consider playing a drinking game. Take a shot each time you see the words "many" or "some" used to support the efficacy of a device.

Digital recorder
A digital recorder, such as a portable device for recording voice memos, is perfect for observing electronic voice phenomena (EVP). Steve has the following to say about the digital recorder (our emphasis to highlight vagueness, uncertainty and anecdotal evidence):

"It's the contention of **many** paranormal experts, and my own **personal experience**, that voices from the other side **can** manifest as EVP (Electronic Voice Phenomena). EVPs are generally inaudible to the human ear, but **can sometimes** be picked up on electronic recording devices. At TAPS, we use digital and analog recorders to attempt to capture EVPs."

It's also the contention of *many* paranormal experts that underpants are best worn on the outside, or on the head. As is the case with EVP, we await evidence in support of the outside-underpants contention. The practice of using a digital recorder to capture EVP is the modern version of leaving a cassette recorder running in a darkened room, and then turning up the volume on playback to try to make sense of static and naturally occurring background noise.

Based on the progression from analog tape to digital recorders, one can only assume that ghosts in the future will learn to encode their wails as MP3s, conveniently emailing them directly to paranormal investigators.

Electromagnetic field (EMF) detector
This device is a lot of fun, particularly if one lacks sufficient knowledge to understand the origin of EMF. There are many different sources of electromagnetic radiation, and it's pure guesswork that ghosts have some kind of EMF signature. EMF activity is likely to always be detected to some extent, barring measurements conducted for people who live in Faraday cages. A good analogy would be to compare an EMF detector to an AM radio receiver. The radio will still pick up background noise, even if it's not tuned to a frequency being used for broadcasting. One could cite this static as proof of the existence of ghosts, and that's pretty much what *Ghost Hunters* are doing, albeit in a more expensive and complicated way. Benjamin Radford of the Committee for Skeptical Inquiry, on *Ghost Hunters'* nonsensical usage of measuring devices, commented **"Just as using a calculator doesn't make you a mathematician, using a scientific instrument doesn't make you a scientist."**

Mini-Digital Video Camera
Steve's explanation of this device is particularly telling (our emphasis): "If you're a serious paranormal investigator, the mini-digital video camera is an indispensable part of your arsenal. Not only will it provide a visual and audio record of your investigation, it will give you unrestricted access to locations and **allow you to see your own reactions to paranormal activity, when it occurs, in real time"**

The emphasized text shows the most important use for such cameras: To get spooky-looking footage. The ideal approach is stand in a creepy room, pointing the camera at your face, and babble incoherently about how eerie things feel. For added effect, avoid editing out footage containing rapid camera angle changes. These jerky shots enhance the feeling of trepidation. The only drawback to this type of camera is that pictures of the investigators and their clients don't look freaky enough.

September/October 2010 Hidden Messages Puzzle Contest Winner: John B. Gaston

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